



**Department of
Transportation**

I-81 VIADUCT PROJECT – PHASE 1, CONTRACT 2

DESIGN-BUILD PROJECT

PIN 3501.91, Contract D900056

Request for Proposals

Addendum #7

February 17, 2023

Modification to the Request for Proposals
I-81 VIADUCT PROJECT – PHASE 1, CONTRACT 2
Design-Build Project
PIN 3501.91, Contract D900056

Note to Proposers

Differences between the deleted pages and the revised pages have been identified as follows:

- Brackets have been inserted on the left-hand margin of the pages to indicate where changes have been made to the documents; and
- Text additions have been shown in underlined red font and text deletions have been shown in crossed out red font.

General Instructions

Delete Page A-5 of the Instructions to Proposers, Appendix A, Project Information, and substitute the attached revised Page A-5.

Delete Page C-9 of the Instructions to Proposers, Appendix C, Technical Submittal, and substitute the attached revised Page C-9.

Delete Page 1 of the Instructions to Proposers, Appendix D, Technical Submittal, and substitute the attached revised Page 1.

Delete Form SCD and Form SP of the Instructions to Proposers, Appendix E, Forms, and substitute the attached revised Form SCD and Form SP.

Delete Pages vi, vii, viii, 101, 151, 161, 166, 167, 168, 172, 188, 189, 190 and 191 of the DB Contract Documents, Part 3, Project Requirements, and substitute the attached revised Pages vi, vii, viii, 101, 151, 161, 166, 167, 168, 172, 188, 189, 190, and 191. Please note, there are no tracked changes included on Pages vii and viii but the pages are included due to updates to the Table of Contents. Also note, there are no tracked changes included on Page 168 but the page is included due to a shift in text resulting from additions to Page 167.

Delete Pages ii and iii of the DB Contract Documents, Part 4, Utility Requirements, and substitute the attached revised Pages ii and iii. Please note, there are no tracked changes included on Pages ii and iii but the pages are included due to updates to the Table of Contents.

Delete Pages 4-2 through 4-14 of the DB Contract Documents, Part 4, Appendix A, Utility Requirements, and substitute the attached revised Pages 4-2 through 4-16.

Add the attached City of Syracuse Department of Water Details and Specifications and Hot Box Aluminum Drop Over Enclosure Specifications to the DB Contract Documents, Part 5, Special Provisions, SP-18 City of Syracuse Local Specifications.

Delete the Staging Area Plans of the DB Contract Documents, Part 7, Engineering Data (Part 5 of 5), and substitute the attached revised Staging Area Plans. Please note there are no tracked changes included on Staging Area Plans and the plans have been reissued in their entirety.

Delete Pages ii and iii of the DB Contract Documents, Part 8, Special Specifications, and substitute the attached revised Pages ii and iii. Please note, there are no tracked changes included on Page iii

but the page is included due to a shift in text resulting from additions to Page ii.

Add the attached Specification for ITEM 683.30240108 – INSTALL RWIS TYPE 1-FULL STATION to the DB Contract Documents, Part 8, Special Specifications.

No other provision of the solicitation is otherwise changed or modified.

provisions of an approved PLA shall be superseded by the PLA to the greatest extent permitted by federal or state law.

A4.0 REFERENCE DOCUMENTS

Reference Documents include but are not limited to the following Documents:

- A. Record Plans for the project area
- B. Geotechnical Data Report
- C. CADD Files
- D. Final Design Report/Final Environmental Impact Statement
- E. Record of Decision
- F. Bridge Inspection Reports

Reference Documents are located at the following Web site address:

<https://www.dot.ny.gov/main/business-center/designbuildproject56>

A5.0 PROCUREMENT SCHEDULE

A5.1 ANTICIPATED PROCUREMENT SCHEDULE

The Department anticipates the following procurement schedule for the Contract:

Activity	Date
Draft RFP Informational Meeting	October 24, 2022
Final RFP to Shortlisted Firms	November 4, 2022
Date Proposers may start submitting ATCs for review	November 4, 2022
Proposal period one-on-one meetings with all Proposers.	December 13, 2022 – February 17, 2023
Final date for Proposers to submit new ATC's for review	February 3, 2023
Final date for requests for changes to Proposer's organization and personnel	February 1, 2023
Final date for Proposers to submit revised ATCs for final review	February 17, 2023
Final date for Department's responses to new ATCs submitted for review	February 10, 2023
Final date for Department's responses to revised ATCs submitted for review	February 24, 2023
Final date for receipt of Proposer questions	February 24 February 20, 2023
Final date for Proposers to respond to conditional approval of ATC's	February 24, 2023
Issue Date for Final Addendum and/or answers to Proposer questions	March 1 February 24, 2023

**Table C
Format of Volume 2**

Proposal Component	Reference
Volume 2, Section 1 – Design-Build Organization and Process	
Volume 2, Section 1A – Key Personnel	
Key Personnel Form R	C2.1
Volume 2, Section 1B – Overall Design-Build Team Organization	
Design-Build Team Organization Chart (Narrative, Max 5 pages plus 11x17 org chart)	C2.2.1
Design-Build Team Communication Protocol (Narrative, Max 5 pages plus 11x17 communication graphic)	C2.2.2
Design-Build Quality Control Plan (max 20 pages plus org charts)	C2.2.3
Volume 2, Section 2 – Design Build Approach to the Project (Technical Solutions)	
Volume 2, Section 2A – Project Understanding	
Project Understanding (Narrative, max 6 pages, Form R1 – max 6 pages, Form R2 – max 6 pages)	C3.1
Volume 2, Section 2B – Design Solutions	
Design Approach (Narrative, max 15 pages)	C3.2.1
Copies of Department's approval letters for each ATC that is incorporated into the Proposer's Proposal along with each submitted ATC that was approved and used.	C3.2.1
Noise Abatement Justification Memo (maximum 2 pages)	C3.2.3
Volume 2, Section 2C – Construction Approach (Means and Methods)	
Overall Project Construction Sequence (maximum 6 pages)	C3.3.1
Work Zone Traffic Control (maximum 3 pages)	C3.3.2
Means & Methods/Sequence of Work at the CSX Bridges (max. 2 pages)	C3.3.3
Protection of Existing Facilities (maximum 1 pages)	C3.3.4
Utility Work (maximum 2 pages)	C3.3.5
Drainage Modifications (maximum <u>24</u> pages)	C3.3.6
Railroad Management Plan (maximum 2 pages)	C3.3.7
Volume 2, Attachment A – Design Drawings	
Project Limits	C3.2.2
General Configurations	C3.2.2
Construction Phasing	C3.2.2
Demolition Limits	C3.2.2
Renderings	C3.2.2
Work Zone Traffic Control	C3.3.2
Volume 2, Attachment B – Project Schedules	
Initial Baseline Progress Schedule (maximum 25 pages)	C4.1
Initial Baseline Progress Schedule Narrative (maximum 8 pages)	C4.1
Form SCD – Schedule of Contract Durations	C4.2

Note: Volume 2, Attachment A – Design Drawings, shall be submitted in a separate 11"x17" binder.

D1.0 INTRODUCTION

This ITP Appendix D provides the general instructions and establishes the content and formatting requirements for the Price Proposal, Volume 3.

Each Proposer shall submit the Price Proposal required pursuant to this ITP Appendix D, organized, separated and labeled in accordance with the checklist in Table D.

All forms named herein are found in ITP Appendix E unless otherwise noted.

Submit all information as specified herein, using the forms and formats specified. Alterations to the forms will only be permitted where specifically allowed.

D2.0 PRICE PROPOSAL

Provide a Price Proposal using the forms listed herein and provided in ITP Appendix E. Failure to provide the requested information on the forms and in the format specified may result in the Department declaring the Price Proposal non-responsive.

Upon Award, the agreed Price Proposal of the selected Proposer will be incorporated into the Contract Documents Parts 1 and 9.

The Price Proposal shall consist of:

- Form PP, Price Proposal Cover Sheet;
- Form SP, Schedule of Prices;
- Form WPS, Work Payment Schedule; and
- Form BB, Bid Bond.

Unless indicated on a specific Form, the supplied Forms are not to be altered.

- Photographs or external web links are not to be included in the Forms;
- All required information must be contained in the Forms;
- Additional lines or pages only allowed when indicated on the Form.

Any Form found to be altered may, at the discretion of the Department's Contract Management Bureau, be removed from the Proposal before evaluation.

D2.1 Proposal price submittal

The Items listed in Section D2.0 shall be submitted in a separate, sealed envelope.

Mark the envelope "I-81 VIADUCT PROJECT – PHASE 1, CONTRACT 2 VOLUME 3" plus the Proposer's name. Securely attach a duplicate copy of Form PP to the outside of the envelope. ~~Mark the envelope "PROJECT NAME VOLUME 3" plus the Proposer's name. Securely attach a duplicate copy of Form PP to the outside of the envelope.~~

D2.2 Schedule of Prices (Form SP)

Complete Form SP, Schedule of Prices (see ITP Appendix E).

FORM SCD
SCHEDULE OF CONTRACT DURATIONS

Table SCD - 1

OVERALL PROJECT COMPLETION (See Note 1 and 2)			
ACTIVITY	DURATION (Calendar Days past NTP)	BID DATE (MM/DD/YYYY)	LIQUIDATED DAMAGES AMOUNT (PER DAY) (See Note 3 and 4)
PROJECT SUBSTANTIAL COMPLETION (See Note 1 and 2)			\$25,000
PROJECT COMPLETION (See Note 1 and 2)	-----		\$10,000

1. The Project Completion Date, to be included in the DB Agreement, Article 4.2, shall be defined by the number of calendar days past NTP as proposed by the successful Proposer and agreed to by the Department. Project Substantial Completion for the purposes of this Form SCD is defined as all construction activities completed, and no additional impacts to traffic, pedestrians, railroads, and subways. Remaining paperwork (i.e. As-Builts, close-out documentation, payments, and demobilization) may occur after the Project Substantial Completion date for the purposes of this Form SCD.
2. The Project Completion Date shall be computed by adding 60 calendar days to the Project Substantial Completion Date from Table SCD-1 and shall include complete demobilization from the work site(s).

The Design Builder's attention is directed to the fact that in no event shall the Project Substantial Completion Date in Table SCD-1 exceed 6/1/2026. In the event the Project Substantial Completion Date exceeds 6/1/2026, it will result in the determination of non-responsiveness.

3. Liquidated Damages will be assessed, in the amount indicated in Table SCD-1, for failure to achieve Project Substantial Completion and Project Completion as required.
4. Multiple Liquidated Damages may be assessed concurrently for failure to complete the required project work in accordance with the Design-Builder's SCD provisions. In the event multiple liquidated damages are being assessed due to the Design-Builder's failure to perform, the sum-total of the liquidated damages shall be capped at seventy-five thousand dollars (\$75,000.00) per day.

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Table SCD - 2a

INTERIM COMPLETION MILESTONES (See Note 5)				
PROJECT COMPONENT	DURATION (Calendar Days past NTP)	MANDATORY COMPLETION DATE (MM/DD/YYYY)	MILESTONE COMPLETION DATE (MM/DD/YYYY)	LIQUIDATED DAMAGES AMOUNT (PER DAY) (See Notes 4 & 6)
VISUAL BARRIER (See Note 7)		4/1/2024		\$10,000
NOISE BARRIERS (See Note 8)		9/1/2024		\$5,000
EAST GLEN AVE (See Note 9)		6/1/2025		\$10,000
SOUTHERN INTERCHANGE (See Note 10)		12/31/2025		\$50,000

5. The Interim Completion Milestone Dates, as submitted by the Proposer and indicated in Table 2a, shall be defined by the number of calendar days past NTP as proposed by the successful Proposer and agreed to by the Department. Where applicable, the Milestone Completion Dates listed in Table 2a shall not exceed the respective Mandatory Completion Dates.
6. Liquidated Damages will be assessed, in the amount indicated, for each calendar day or partial calendar day due to failure to achieve the Milestone Completion Date of the Project Component as submitted by the Proposer and indicated in Table SCD-2a.
7. Visual Barrier is defined as all work associated with the construction of the Visual Barrier along the west side of the Southern Interchange. Counting of days will continue until construction of the barrier is complete. This work includes but is not limited to: clearing and grubbing, drainage, foundations, and wall columns and panels. Final grading and site restoration, including landscaping, is not included in this milestone.
8. Noise Barriers are defined as all work associated with the construction of Noise Barriers NB-7B, NB-8B, and NB-9. Counting of days will continue until construction of the barriers are complete. This work includes but is not limited to: clearing and grubbing, drainage, foundations, wall columns and panels, final grading, and site restoration.
9. East Glen Ave is defined as all work associated with the reconstruction of East Glen Ave from Brighton Ave to STA S4B 0+00, including the proposed access roadways to the Heritage and Loretto properties and all connector ramps to and from BL 81. Counting of days will continue until all construction within the roadway limits is complete and the permanent roadway is open to traffic in its final configuration with no further disruptions to traffic. This work includes but is not limited to: roadway construction, pavement, drainage, retaining walls, foundations, substructures, superstructure, concrete deck, shared use path, railing, fencing, lighting, signals, signing, and striping.

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10. Southern Interchange is defined as all work associated with the construction of the new Southern Interchange roadways connecting the existing I-481 with the existing I-81, including all proposed connector ramps. Counting of days will continue until all construction within the roadway limits is complete and the permanent roadways are open to traffic in their final configuration with no further disruptions to traffic. This work includes but is not limited to: roadway construction, pavement, drainage, retaining walls, foundations, substructures, superstructure, concrete deck, barriers, railing, fencing, signing, and striping.

Table SCD - 2b

IMPACTS TO TRAFFIC (See Note 11)					
PROJECT COMPONENT	TRAFFIC IMPACT DURATION (CALENDAR DAYS)		TRAFFIC IMPACT DURATION PLUS 40 WORK DAYS (CALENDAR DAYS)	MANDATORY COMPLETION DATE (MM/DD/YYYY)	LIQUIDATED DAMAGES AMOUNT (PER DAY) (See Notes 4 & 12)
EAST BRIGHTON AVE OVER NEW I-81 (See Note 13)	Max Allowed		N/A	12/1/2025	\$10,000
ROUTES 5 AND 92 RECONSTRUCTION (See Note 14)	Max Allowed		N/A	12/1/2025	\$10,000
I-81 OVER CSX RAILYARD (See Notes 15 & 16)	Max Allowed			12/31/2025	\$25,000

11. Traffic Impact Duration is defined as the number of consecutive Calendar Days between the date of the first traffic Impact Day for a given roadway and the date of the last Traffic Impact, in accordance with Note 11. Where applicable, the completion of the Project Components listed in Table 2b shall not exceed the respective Mandatory Completion Dates.

- a) Lane closures to collect engineering data in accordance with the RFP may be performed without counting toward the Traffic Impact Duration provided no physical work of any kind is performed.
- b) Landscaping work, including vegetative plantings, is excluded from the counting of Traffic Impact Days.

12. Liquidated Damages will be assessed, in the amount indicated, for each calendar day or partial calendar day due to failure to achieve all necessary work associated with the Project Component as submitted by the Proposer and indicated in Table SCD-2b, or for each calendar day or partial calendar day that exceeds the mandatory completion date for each Component.

13. East Brighton Ave over New I-81 is defined as all work associated with the replacement of the bridges carrying East Brighton Ave over New I-81 (BIN 1069100, BIN 1069110). Counting of Traffic Impact Days will begin upon commencement of the setup of necessary WZTC devices

to facilitate any construction work on the bridges and/or approaches and will continue until all work associated with the replacement of the bridges has been completed, and all travel lanes, shoulders, sidewalks, and bike lanes are open to vehicular and pedestrian traffic, in their final configuration, with no further disruption to traffic. This work includes but is not limited to: foundations, substructures, superstructure, concrete deck, barriers, approach slabs, retaining walls, drainage, final pavement markings, signs, and bridge railing.

14. Route 5 and 92 Reconstruction is defined as all permanent work associated with the Reconstruction of Routes 5 and 92 that will impact vehicular and pedestrian traffic and local businesses within the Route 5 and 92 limits of work, including the ramps to and from these routes. Counting of Traffic Impact Days will begin upon the commencement of the setup of necessary WZTC devices on Routes 5 and 92 to facilitate any permanent construction work not related to utilities, and will continue until all construction work including utilities, removal of all temporary works, and final grading is complete, and the roadway, ramps, and sidewalks are permanently open to vehicular and pedestrian traffic in their final configuration, with no further disruption to vehicular or pedestrian traffic. This work includes but is not limited to: roadway widening, final pavement, pavement markings, drainage improvements, signs, signals, utilities, and street lighting. The demolition of the off ramp from I-81 SB (former I-481) to East Genesee Street EB is not included in this milestone.
15. I-81 over CSX is defined as work associated with the reconstruction and widening of the bridges carrying I-81 over CSX (BIN 1093571, BIN 1093572). Counting of Traffic Impact Days will begin upon commencement of the setup of necessary WZTC devices to facilitate any construction work on the bridges and/or approaches and will continue until all work associated with the reconstruction and widening of the bridges has been completed, and three travel lanes ~~(in each direction)~~, and shoulders are open to vehicular traffic. Further disruption to traffic shall be limited to lane shifts and off-peak closures in accordance with Part 3, Section 19 of the RFP. This work includes ~~but is not limited to:~~ foundations, substructures, superstructure, concrete deck, barriers, approach slabs, retaining walls, drainage, signs, and bridge railing. This work does not include: superstructure painting, shielding removal, final pavement markings, site restoration, and any other incidental work related to this bridge that does not impact the permanent opening of three travel lanes in each direction.
16. The Traffic Impact Duration for I-81 over CSX Railyard shall include two activities that build 40 workdays of total float into the schedule that shall be used during construction to account for the unavailability of Railroad Protective Services (ie- flagger, FCI, etc.). The duration bid on Table 2b shall include these activities. Railroad Protective Services are considered unavailable when they are requested in accordance with Part 5, SP-19, and the Design-Builder is informed that they are not available, or when Railroad Protective Services are confirmed within one week of the requested date and later cancelled by the railroad.

The Design-Builder's CPM schedule shall include 20 workdays of unavailable Railroad Protective Services for each of the 2024 and 2025 construction seasons. This float shall be identified as an individual activity at the end of each construction season and shall fit into the schedule prior to winter travel lane requirements taking effect on December 1. Refer to Part 3, Section 19 for WZTC requirements. There will be no additional payment to the Design-Builder for loss of productivity during the 40 workdays of unavailable Railroad Protective Services. As an unavailable Railroad Protective Services day is realized, the related float activity shall be reduced on a day-for-day basis.

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The Proposer commits to meet the Contract Durations specified above.

PROPOSER	
SIGNED	
DATE	
NAME (printed or typed)	
TITLE	

FORM SP
SCHEDULE OF PRICES

Proposer: _____

Item #	Item Name	<u>Price</u> (1)
800.06000115	Design Build – Construction Work – Bridge No. 14	
800.06000215	Design Build – Construction Work – Bridge No. 15	
800.06000315	Design Build – Construction Work – Bridge Nos. 16 & 17	
800.06000415	Design Build – Construction Work – Bridge No. 1	
800.06000515	Design Build – Construction Work – Bridge No. 7	
800.06000615	Design Build – Construction Work – Bridge No. 8	
800.06000715	Design Build – Construction Work – Bridge No. 9	
800.06000815	Design Build – Construction Work – Bridge No. 10	
800.06000915	Design Build – Construction Work – Bridge No. 11	
800.06001015	Design Build – Construction Work – Bridge Nos. 12 & 18	
800.06001115	Design Build – Construction Work – Bridge No. 13	
800.06001215	Design Build – Construction Work – Exit 3 to Northern Project Limit (not including Bridge Work), including Route 5 and Route 5/92 Intersection	
800.06001315	Design Build – Construction Work – Southern Interchange, including adjacent work to and from the Southern Interchange (not including Bridge Work)	
800.06001415	Design Build – Construction Work – Noise Barriers & Visual Barrier	
800.06001515	Design Build – Construction Work – Bridge Demolition and Removal	
800.06010115	Design Build – Construction Work – Steel Superstructure Repairs – Directive Repairs	
800.06020015	Design Build – Construction Work – Steel Superstructure Repairs – Unanticipated Repairs	\$2,000,000
800.06060115	Design Build – Construction Work – Concrete Substructure Repairs – Directive Repairs	
800.06070015	Design Build – Construction Work – Concrete Substructure Repairs – Unanticipated Repairs	\$2,000,000

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800.0608NN15 800.06080115	Design Build – Construction Work – Concrete Retaining Wall Repair Work – Directive Repairs	
800.04001115	Design Build – Extra Work	\$18,000,000
	Subtotal A	
800.05000015	Design Build – Site Mobilization (Maximum 4% of Subtotal A)	
	Subtotal B (Sum of Subtotal A and Site Mobilization)	
800.14000115	Design Build – Local Hire Incentive	\$3,105,000
800.15000115	Design Build – Training Requirements	\$1,201,000
800.16000120	Steel/Iron Price Adjustment	\$4,000,000
800.01000015	Design Build – Design Services	
800.02000015	Design Build – Construction Inspection Services	
800.03000015	Design Build – Quality Control Services	
	TOTAL PROPOSAL PRICE	

Notes:

- A) Proposers shall complete Form SP using the excel spreadsheet located on the Department's Project web site.
- B) Subtotal B will be the value used to *calculate* the 30% Prime/DB self work requirement less any Self Performance Specialty Items included in Part 5 – Special Provisions.

Instructions:

- A) Enter Lump Sum Price for each Price Item in the white, non-shaded, cells.

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SECTION 7 ENVIRONMENTAL

7.1 SCOPE

Except as otherwise detailed herein, the Design-Builder shall be responsible for preparing its design, obtaining environmental approvals, carrying out construction activities, performing Quality Control, and undertaking other activities, including hazardous materials inspection and testing, as needed to ensure compliance with the Project's Environmental Requirements and all applicable environmental laws and regulations.

Both permanent and temporary impacts to wetlands, based on the Indicative design, are identified in Part 6 – Indicative Drawings. The Indicative design for this contract permanently impacts 0.28 acres and temporarily impacts 0.494 acres of Federal Wetlands and Surface Waters. The Indicative design permanently impacts 0.27 acres and temporarily impacts 0.50 acres of state wetlands. The Design-Builder shall not exceed these proposed impacts.

7.2 ENVIRONMENTAL APPROVALS

The Department has determined that this Project is a National Environmental Policy Act (NEPA) Class I project in accordance with 23 CFR 771. NEPA Class I projects require the preparation of an Environmental Impact Statement (EIS) to determine the impact that project alternatives would have on the environment.

The Department has determined that this project is classified as a “non-Type II” action, indicating that it has the potential for significant environmental impacts or substantial controversy on environmental grounds. In accordance with 17 NYCRR Part 15, given that a Federal EIS has been prepared, NYSDOT and other New York State agencies undertaking a discretionary action for the Project have no obligation to prepare a separate EIS under New York’s State Environmental Quality Review Act (SEQR).

The following environmental approvals/permits have been obtained or are in the process of being obtained by the Department:

Permit or Approval	Approving Agency	Regulatory Authority
Section 404 Permit pursuant to the Clean Water Act	U.S. Army Corps of Engineers	33 USC §§ 1251-1387 and 33 CFR §§ 320-330
Section 401 Water Quality Certification pursuant to the Clean Water Act	U.S. Army Corps of Engineers and New York State Department of Environmental Conservation	33 USC §§ 1251-1387 and 33 CFR §§ 320-330
Protection of Waters / Freshwater Wetlands Permit	New York State Department of Environmental Conservation	NYSDEC/NYSDOT Memorandum of Understanding Regarding ECL Articles 15 and 24 (February 19, 1997); ECL Article 15, Title 5; 6 NYCRR Part 608; ECL Article 24; 6 NYCRR 663
Wetlands Finding	Federal Highway Administration	Executive Order 11990 of 1977; USDOT Order 5660.1A,

6. Kirkville Road - from 250 feet west and north of the Fly Rd./Kirkville Rd intersection to 200 feet east of the Roberts St./Kirkville Rd. intersection.
- C) Provide signing, traffic signals and pavement markings for bicycle and pedestrian facilities within the Brighton Ave, East Glen Ave, and Routes 5/92 limits of work;
- D) Locate signs in accordance with the National MUTCD and the NYS supplement to the National MUTCD. Design overhead sign structures in accordance with the NYSDOT Overhead Sign Structures Design Manual;
- E) As applicable, and within the limits noted above, all existing I-81 shields shall be replaced with BL 81 shields, all I-481 shields shall be replaced with I-81 shields;
- F) All exit numbers on existing signs, within the limited notes above, will provide the new mileage based exit number as well as the former exit number as indicated in the Part 6 –Indicative Plans;
- G) Design-Builder shall maintain the I-81 and I-481 shields so they are visible until the Department directs they can be changed, which will occur when the routes are officially designated and de-designated. At that time, the route panels with the new designations may be visible;
- H) All reference markers along the highway segments noted above shall be replaced in accordance with the NYSDOT Reference Marker Manual. Reference markers shall have a 7 ft mounting height;
- I) Provide signs with high reflectivity with Type IX sheeting such as to not warrant sign lighting;
- J) Design-Builder shall replace all interstate shields for I-81 and I-481 with BL 81 and (new) I-81 within 1 mile of interchanges; ~~and~~
- K) Design-Builder shall design, install, and/or relocate the following signs for the Loretto property:
- DOT Traffic and circulation control signs at the Loretto roundabout for stop, yield, speed, etc.
 - Existing campus directional signs shall be relocated along the roundabout.
 - Offsite DOT signage at new off and on-ramp locations for visitors to find their way to the Loretto campus.
- ~~J)L)~~ Provide municipal boundary signs along existing I-481 corridor; and
- ~~K)M)~~ New guide signs shall not reference “Shoppingtown” or “Shoppingtown Mall” as a destination.

16.3.2 Construction Requirements

16.3.2.1 Signs

The Design-Builder shall not reuse any existing NYSDOT sign materials as part of the permanent signing installation and shall be responsible for the disposal of all signing materials and structures that are removed from the Project. Standard signs owned by municipalities other than NYSDOT, and non-standard signs owned by private entities but placed within NYSDOT right-of-way, with the acceptance of the Department, shall be removed, stored and reinstalled as required.

The Design-Builder shall be responsible for the provision of all signs, posts, frames and other structural components required for the installation and support of the sign panels.

16.3.2.2 Pavement Markings

Cross hatching pavement markings shall be installed in accordance with the Department's Specifications for Epoxy Reflectorized Pavement Markings. All special markings (Letters &

SECTION 18 INTELLIGENT TRANSPORTATION SYSTEMS (ITS)

18.1 SCOPE

The Design-Builder shall perform all work necessary to design, furnish, build, and install temporary and permanent replacement of all ITS communication system field devices for uninterrupted service of the regional traffic management and traffic signals.

All work items shall not interrupt the Traffic Management Center (TMC) operation. The Design-Builder shall coordinate with the engineer and the TMC prior to any work item at the TMC.

The Region 3 TMC operates 24/7 365 days per year and currently shares video information with Onondaga County 911 Center and the public via 511.ny.org or NYS Claris. In order to minimize disruptions to the Region 3 TMC operation, the following conditions shall be adhered to by the Design-Builder when removing, modifying, or replacing items under this contract unless specifically noted:

- No more than two (2) locations shall be down simultaneously
- No more than two (2) licensed frequency links shall be down simultaneously
- The Design-Builder shall make every effort to reestablish communication and video images to the TMC by the end of the day, with a maximum of 48 hours to reestablish. This includes the necessary integration of the device into the Region 3 TMC's operation via existing software.
- The TMC Shall be contacted at least 2 business days before work begins on any ITS equipment.

The ITS System work in the Project shall consist of the following:

Removal of:

- 2 permanent Variable Message Signs (VMS), 4 cameras and poles, and 1 Acoustic Detection Systems and 2 Ice Detection Systems.

Installation of:

- 2 VMS, 4 cameras and poles, ~~and 4 Acoustic/Radar Detection Systems,~~ 2 Ice Detection Systems, and 2 Road Weather Information Systems.

The Design-Builder shall design, furnish and install a complete, operational and tested ITS system including all required electronic devices for the System, all associated mounting hardware, all associated cabling and integrate those devices into the NYSDOT Transportation Management Center (TMC). Final integration to the NYSDOT TMC system will be coordinated with NYSDOT. The Design-Builder shall be responsible for all other work related to the ITS within the Project limits.

The Design-Builder shall maintain and protect any existing Fiber Optic trunk cables located in the NYSDOT Right of Way. Should any disruptions of the existing Fiber Optic network be required due to the Design-Builder's operations, a temporary communication system or bypass communication linked to the NYSDOT TMC shall be provided. None of the current functionality

18.3.4 Ice Detection System

18.3.4.1 Removal of Ice Detection System

The two (2) existing ice detection systems on the I481 bridges over CSX shall be removed by qualified technicians, including cabinets, signs, poles, and all electronics.

18.3.4.2 Installation of Ice Detection System

Two (2) ice detection systems shall be installed by qualified technicians, including cabinets, signs, poles, and all electronics in the vicinity of the removed ice detection systems. Each system shall be configured to supply an I/O trigger for activation of a flashing sign beacon via hardware connection based on weather conditions.

18.3.5 Pullboxes

18.3.5.1 Fiber Optic Pullboxes

Pullboxes shall have a two foot minimum drainage bed of No. 2 crushed stone or gravel placed below the pullbox.

All pullboxes required shall be standard 26 inch x 18 inch and shall be reinforced concrete only.

No pullboxes shall be placed within the asphalt roadway. On Standard Sheet 680-04, all pullboxes shall be set to ½ inch below grade with all the surrounding surfaces, except sidewalks, where they shall be flush.

Pullbox covers may be designed with or without ribs and shall be heavy duty to safely withstand the AASHTO HS-25 loading.

All pullbox cover frames shall be grounded. Electrical pullbox covers shall be bonded to the frame with a #6 AWG grounding conductor.

All conduits shall exit the pullbox from the narrow side of the box.

At a minimum, one pullbox shall be installed at the power source, one shall be installed next to each piece of equipment (camera, VMS, etc.), and one shall be installed next to the equipment cabinet for each piece of equipment. Maximum spacing between pullboxes is 150 feet.

Design-BUILDER shall allow for 100 foot coils in each pullbox and cabinet. If a pullbox has limited space, the Design-BUILDER shall leave as much linear feet of coil as possible without restricting access

At any location where conduit will be attached to a bridge, a galvanized cast iron junction box shall be installed/attached at the ends of the bridge where the conduit changes to different conduit types or materials. This junction box shall meet or exceed the requirements for the associated item number listed in the Device Requirements Table.

18.3.6 Traffic Signal Interconnection

Section Not Used.

18.3.7 Temporary Wireless Radio and Antenna

As required during construction, the existing wireless radio communication system may be relocated to maintain uninterrupted services to the NYSDOT TMC. If this is needed, the Design-BUILDER shall coordinate with the Region 3 NYSDOT TMC.

18.3.8 Central Computer System at TMC

All equipment installed under the contract shall be consistent with the Regional ITS Architecture and the ITS Strategic Plan for the Region, including compatibility with the Region 3 Transportation Management Center ATMS software. All relevant RITSA Service Packages shall be identified prior to design for any ITS equipment to be deployed.

The IP address assignments shall be provided to the Design-Builder by the NYSDOT TMC.

18.3.9 Electrical Work

The Design-Builder shall provide all 120/240VAC power necessary for the construction and System installation and shall include the furnishing and installation of all labor and equipment. All power, video and data circuits entering or exiting the cabinets shall be furnished with surge lightning protection. The Design-Builder shall maintain the integrity of all circuits in service that may be affected by the work.

The Design-Builder shall furnish and install cabling and conduit between the controller cabinet and the ITS equipment cabinet, the ITS cabinet and pullbox, the fiber and pulboxes, and the power source. It shall be the responsibility of the Design-Builder to verify that the cabling and its routing are sufficient for their needs.

18.3.9.1 Cabling Requirements

The minimum size cable used for power circuits and ground wires shall be #12 AWG. Alternate cable sizes that can be utilized for power and ground are #6AWG and #2AWG. Voltage Drop calculations for the electrical service drop to the ITS cabinet shall be provided.

Power cabling and wires installed outdoors and underground shall be rated for 600V, rated for wet locations and gasoline and oil resistant.

All cables provided shall be provided with terminations, connectors, and splices as needed and shall be installed within the existing or proposed conduits. All termination cables provided shall be provided with terminations, connectors and splices as needed.

All cables shall be clearly labeled with identifying label or tags clearly indicating the circuit # and/or VMS #.

All electrical enclosures and boxes provided by the Design-Builder shall be stainless steel NEMA 4X.

All conduits shall be hot-dipped Rigid Galvanized Steel (RGS). All fittings and conduit bodies shall be hot-dipped galvanized.

18.3.10 Road Weather Information System (RWIS)

18.3.10.1 Removal of RWIS

There are no RWIS to be removed.

18.3.10.2 Installation of RWIS

Two (2) RWIS Type-1 Full Stations, including poles, cabinets, atmospheric sensors, and noninvasive pavement condition sensors, shall be installed by qualified technicians and hardwired to the Ice Detection Systems. The cabinets shall be installed adjacent to the Ice Detection Systems. The RWIS mounting structure pole shall be furnished by the Design-Builder after approval by the Department.

The Regional Transportation Management Center (RTMC) requires a minimum of 2 weeks to review RWIS licenses, equipment, and warranty information

18.4 POWER SOURCE

The materials and work associated with the power utility connection shall be supplied and performed for the power utility company.

The Design-Builder shall coordinate manhole entry, service box location, and metering locations with the power company and Regional ITS Maintenance before starting work at a site.

The service conductor shall be a single conductor cable, No 2 gage. It shall consist of three individual conductors: two black colored conductors and one white colored conductor.

The Design-Builder shall leave enough cable coming out of the riser assembly to reach the height of the utility company's primary lines.

The meter channel assembly shall not be installed on the equipment cabinet. If the meter channel assembly can't be installed on the CCTV camera pole then it shall be installed on a wood post assembly near the equipment cabinet. If a wood post assembly is used, the Design-Builder shall submit a layout plan for mounting the equipment on the wood post.

When electrical service is installed on the CCT camera pole, the meter channel assembly shall be attached to the pole with stainless steel banding only.

The meter channel shall be installed such that it is located away from the vehicular traffic flow and at a height that complies with the local utility company.

All power services should be terminated and replaced with new services/disconnects for new equipment.

18.5 EQUIPMENT CABINET/DISCONNECT SWITCH

The Design-Builder shall install a base mounted equipment bracket, Type 332 at each camera location. The equipment cabinet shall meet or exceed the specification for the item listed in the Device Requirements Table. Equipment cabinets shall be located such that the cabinet door is on the side with the greatest distance from the roadway edge. The longest dimension shall be parallel to the roadway; the orientation of cabinet doors with respect to the adjacent roadway shall be approved at each cabinet location prior to installing the cabinet foundation or electrical conduits by the Regional ITS Maintenance Staff.

A 5 ft x 5 ft x 4 in concrete work pad shall be installed in front of the cabinet door as detailed on standard sheet 680-05.

Each and every cable entering the equipment cabinet and pullboxes shall be permanently marked by function and phase stamped on NYSDOT approved tags. The tags shall be attached to the cables with plastic or nylon line.

Each and every conduit entrance to the equipment cabinet shall be sealed using non-shedding stainless steel sponges. The steel sponges should not actually be placed inside the cabinet but inside the conduit as it passes into the cabinet.

Upon completion, all equipment cabinets shall have IP power distribution units and temperature monitoring systems installed and operational.

All equipment cabinets shall be ground mounted. Cabinets shall be mounted on an equipment cabinet signal base, which meets or exceed the specification for the associated item listed in the Device Requirements Table. Refer to Standard Sheet 680-05 for additional base mounted cabinet details.

The Design-Builder shall install an electrical disconnect/generator transfer switch at the same location where the electrical meter is located. When installed on the CCTV camera pole it shall be located beneath the meter channel. Each ITS device shall have its own meter and disconnect.

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- Shop drawings, which must be viewed and approved by R3 ITS/TMC before being used on the project.

18.8 DEVICE REQUIREMENTS

Equipment	Associated Item Number
100 ft Camera Pole with 5 Lowering Devices	683.04100502
IP Power Distribution Unit	683.96100305
5.8 GHz Point to Multipoint Ethernet Radio	683.10900010 and 683.10910010
Camera Assembly	683.10120008
MPEG-2/4 Video Encoder-Decoder	683.95010011
Ethernet Switch	683.95050010
Base-Mounted Equipment Cabinet Type 332	683.06010013
Variable Message Sign	683.93183104
Acoustic/Radar Vehicle Detector Assembly	683.91150010
Aluminum Microcomputer Cabinet Base	680.80325010
Electrical Disconnect/Generator Transfer Switch	680.94997008
<u>Road Weather Information System Type 1</u>	<u>683.30240108</u>
<u>Ice Detention Systems</u>	

Stormwater shall be conveyed from point to point through the use of a single pipe. Smaller pipes in parallel shall not be permitted.

21.3 REQUIREMENTS

21.3.1 Drainage Report

The Design-Builder shall provide a Drainage Report to the Department and any other entities whose facilities will be impacted by the Project in accordance with HDM Chapter 8. The Design-Builder shall be responsible for coordination in advance with any third party to determine the necessary document submission required by the third party. At least two weeks prior to providing documents to any third party, the Design-Builder shall submit a draft Drainage Report to the Department's Design Quality Assurance Engineer for consultation and written comment.

The Drainage Report shall document the design criteria used, final design basis, and all supporting calculations and computer model output.

21.3.2 Southern Interchange Drainage

Temporary and permanent drainage systems shall be designed and constructed to capture runoff and prevent ground surface infiltration in the Southern Interchange/

100% of the surface runoff that contributes to the roadside ditches and drainage channels within the Southern Interchange Impervious Drainage Limits shall be routed to the existing 6-foot diameter concrete culvert, CIN C330114 (inlet located approximately 315 feet south of the existing East Glen Avenue bridge). All drainage ditches, channels, and stone protection areas at culvert inlets and outlets shall be designed to be impervious. Refer to RFP Part 7 – Engineering Data for the Southern Interchange Impervious Drainage Limits and the Potential Existing Sinkhole Area of Concern. Refer to the Geotechnical Data Report, posted as a Reference Document on the project website, for additional information regarding potential karst sinkholes in the identified Potential Existing Sinkhole Area of Concern.

The Design-Builder shall evaluate the capacity of the existing 6-foot diameter concrete culvert, CIN C330114, and determine adequacy for a 25-year design storm. If required, the Design-Builder shall design an impervious detention pond to control the discharge from the Southern Interchange drainage area such that the capacity of the existing outlet culvert is not exceeded.

On the west side of I-81, south of STA H3 129+00, the Design-Builder shall develop a drainage plan that demonstrates that under the build condition, the amount of runoff that flows down the I-81 embankment and flows across the westernmost highway boundary will result in a minimum 5% reduction from the existing condition.

21.3.3 I-81 over CSX Railyard Bridges

The Design-Builder shall design and construct a new drainage system including scuppers and downspouts within the rehabilitation and widening limits of work.

~~21.3.3~~21.3.4 Video Inspection

The Design-Builder shall perform a video inspection on existing underground drainage facilities that are to remain within the limits of pavement reconstruction as noted in Section 22, and a post-construction video inspection of the functioning underground drainage facilities after all drainage construction work is completed. The inspection shall include all drainage facilities up to the nearest downstream structure beyond the project limits.

~~21.3.4~~21.3.5 Connections to Existing Systems

The Design-Builder shall develop Design Plans and Project Specifications for any connections to existing storm systems. The Design-Builder shall be responsible for calculations performed to ensure there is sufficient capacity to accommodate any increase in flow due to changes in drainage catchment area and/or to land use. This paragraph shall not be construed to relieve the Design-Builder of the obligation to treat runoff water that requires treatment.

For all reconstructed median areas, existing median barrier drainage openings shall be eliminated and replaced with new drainage connections meeting current standards.

~~21.3.5~~21.3.6 Spill Management

Spill prevention and response measures shall be described in the SWPPP.

21.4 DELIVERABLES

Deliverables shall be as stated elsewhere in the RFP documents.

SECTION 22 HIGHWAY DESIGN

22.1 SCOPE

The Design-BUILDER shall be responsible for the design, construction and reconstruction of the permanent roadway(s) to be constructed within the Project Limits, and any other roads damaged by construction operations, or necessary for permanent operations, all in accordance with the design requirements stated herein. Highway design, construction and reconstruction shall be understood to include the design, furnishing materials, and construction of all road appurtenances, protections, and safety devices not specifically cited in other Project Requirements.

22.2 STANDARDS

The Design-BUILDER shall perform the Work in accordance with the Contract Documents and the Applicable Standards, Design Codes and Manuals listed in Section 1.6, unless otherwise stipulated in this Project Requirement or otherwise applicable to the Project.

22.3 REQUIREMENTS

22.3.1 General

The Design-BUILDER shall be responsible for performing the detailed highway design and construction within the Project Limits in accordance with the Project Requirements set forth herein. The Design-BUILDER shall not design highway geometrics to, or near, minimum design values unless justified for reasons other than cost or schedule.

22.3.2 Design Requirements

Design Criteria (Critical Design Elements), Non-Standard Feature Justifications and Non-Conforming Features to be Retained are provided in Part 7, Engineering Data.

Route 173 is classified as an Urban Minor Arterial (16), which can have a min./max design speed of 30 mph / 45 mph. The 2021 85th speeds are 36.6 MPH EB and 36.4 MPH WB. A design speed of 40 mph shall be used.

Other design requirements shall be as stipulated in the NYSDOT Highway Design Manual.

22.3.3 Guide Railing, Barrier Systems and Impact Attenuators

The Design-BUILDER shall remove and dispose of all existing guide railing, barrier systems and/or impact attenuators, and replace with new guide railing, barrier systems and/or impact attenuators to current NYSDOT Standards within the following limits:

- A) Adjacent to roadway areas requiring widening, reconstruction ,or resurfacing.
- B) Adjacent to roadway areas where noise barriers are constructed.

The Design-BUILDER shall install guiderail at sign locations which require guiderail in accordance with Department standards.

Any guide railing and barrier systems removed due to the MPT scheme shall be replaced with a new system and new materials.

The limits of work for new roadside and new median barrier shall be the lesser of the following:

- 1) The point where barrier is no longer warranted; or
- 2) A point where the proposed barrier can be transitioned to an existing barrier system which conforms to current standards.

All existing guide railing, barrier systems and/or impact attenuators that are removed shall become property of the Design-BUILDER.

Median Barriers shall be installed on existing I-481 and existing I-81 (future I-81 and BL-81) for any traversable median less than 72 feet. The new barriers shall be located adjacent to the shoulder.

As noted in the Non-Standard Feature Justification, I81SB (existing) to I81 (former I481) shall have guiderail that will not cause sight line restrictions, as well as meet all other requirements as noted in other parts of this RFP.

22.3.4 Clear zone

The Design-Builder shall clearly show the “clear zone” on the final record plans. The clear zone shall comply with NYSDOT Highway Design Manual (HDM).

22.3.5 Sidewalks

The Design-Builder shall remove the existing Portland Cement Concrete sidewalks and curbs and construct new Portland Cement Concrete sidewalks and new 6" height Granite curbs within the limits shown on the Part 6, Indicative Plans.

For all sidewalks constructed, the Design-Builder shall comply with all requirements in ED 15-004 Design, Construction and Inspection of Pedestrian Facilities in the Public Right of Way and the sidewalk running slope and cross-slope shall be as follows:

- Design and Layout Limits - Running Slope:
 - If the highway/bridge grade is 5% or less: running slope is 4.5% max
 - If the highway/bridge grade is more than 5%: running slope follows highway edge of pavement max
- Design and Layout Limits - Cross Slope: 1.5% max
- Design and Layout Limits - Width: Varies, refer to Part 6 Indicative Typical Sections and General Plans.

Refer to ED 15-004 for Limits of Work Acceptance criteria.

22.3.6 Curb Ramps

The Design-Builder shall remove all existing curb ramps and construct new Portland Cement Concrete ADA compliant curb ramps at all crosswalks and intersections in accordance with Part 6, Indicative Plans. Detectable warning units shall be cast iron.

For all curb ramps constructed, the Design-Builder shall comply with all requirements in ED 15- 004 Design, Construction and Inspection of Pedestrian Facilities in the Public Right of Way, and NYSDOT Standard Sheets 608 Series.

22.3.7 New Curb Construction

The scope includes new curb installations within the limits shown on the Part 6, Indicative Plans, New curbing shall be 6" height Granite.

22.3.8 Shared Use Paths

The scope includes a shared-use path along the relocated East Glen Avenue to the Private Drive west of BL 81, as shown on the Part 6, Indicative plans.

22.3.9 Bike Lanes

The scope includes bike lanes along the East Brighton Avenue corridor, as shown on the Part 6, Indicative plans and in the Part 7 – Engineering Data, Design Criteria Tables.

22.4 DESIGN EXCEPTIONS AND NON-STANDARD FEATURES

It is the responsibility of the Design-Builder, in coordination with the Department, to obtain approval of any non-standard features included in the final design. Non-standard features that have previously been approved in the Design Approval Document, and are included in Part 7 Engineering Data, do not need to be submitted for approval. The approved non-standard value shall be adhered to.

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City of Syracuse (Sanitary)	John Kivlehan	315-448-8205	JKivlehan@syr.gov.net
City of Syracuse (Street Lighting)	Ken Towsley	315-448-8681	KTowsley@syr.gov.net
Town of Dewitt (Water)	Mathew Reynolds	315-446-3910 x4	water@townofdewitt.com
Town of Dewitt (Lighting)	Rocco Conte	315-437-8331	highway@townofdewitt.com

A-2 UTILITY INVENTORY

The types, sizes and approximate locations of utilities present in the immediate Project area are described below.

A-2.1 Telecommunications

A-2.1.1 Verizon of New York Inc.

Aerial facilities at the following locations on I-81 / I-481 South Interchange:

- Adjacent to Brighton Ave, approximately at Station S4D ~~103~~104+75
- Adjacent to Brighton Ave, approximately at Station S4D 102+25

Aerial facilities at the following locations on I-481, I-690 to Kirkville Road:

- Along Manlius Center Road, crossing under I-481 bridges at approximately Station H6A 14+50

Aerial facilities at the following locations ~~at on I-481~~ E. Genesee St. Interchange; Routes 5 & 92 Interchange, Lyndon Corners

- Along Routes 5 and 92 from approximately Station S6A 8+50 to Station S6A 12+40
- Located at approximately Station R6B 129+~~60~~75
- Located at approximately Station R6B 134+00

Aerial facilities at the following locations at Routes 5 & 92 Interchange, Lyndon Corners:

- Along Routes 5 and 92 from approximately Station S6C 101+00 to Station 107+50

Underground facilities at following locations on I-81 / I-481 South Interchange:

- Duct Bank I-81 at E. Seneca Turnpike at approximately Station R3A 93+50
- Duct Bank located over I-81 at E. Glen bridge crossing at approximately Station R2A 46+00

A-2.1.2 Charter Communications

Aerial cable TV lines are located at the following locations on I-81 / I-481 South Interchange:

- Adjacent to Brighton Ave, approximately at Station S4D 100+90 to S4D 119+50~~107+40~~
- ~~Adjacent to Crossing~~ Brighton Ave, approximately at Station S4D ~~403~~104+75
- ~~Adjacent to Crossing~~ Brighton Ave, approximately at Station S4D 102+25
- ~~Middle of new Crossing relocated~~ East Glen, approximately at Station S4B 10+~~60~~50

Aerial cable TV lines are located at the following locations on I-481, I-690 to Kirkville Road:

- Along Manlius Center Road, crossing under I-481 bridges at approximately Station H6A 14+50

Aerial cable TV lines are located at the following locations on I-481/E. Genesee St. Interchange, Routes 5 & 92 Interchange, Lyndon Corners:

- Along Routes 5 and 92 from approximately Station S6A 8+50 to Station S6A 12+40
- Located at approximately Station R6B 129+75

Aerial cable TV lines are located at the following locations at Routes 5 & 92 Interchange, Lyndon Corners:

- Along Routes 5 and 92 from approximately Station S6C 101+00 to Station 107+50

Underground cable TV lines are located ~~at~~in the following locations on I-81 / I-481 South Interchange:

- Crossing I-81 along E. Seneca Turnpike at approximately Station R3A 93+50

A-2.1.3 First Light Fiber, Inc.

Aerial telecommunication lines located at the following locations on I-481, I-690 to Kirkville Road:

- ~~Under the I-481 bridges at~~Along Manlius Center Road, crossing under I-481 bridges at approximately Station H6A 14+50

A-2.1.4 Crown Castle

Aerial telecommunication lines located at the following locations on I-481, I-690 to Kirkville Road:

- ~~Under the I-481 bridges at~~Along Manlius Center Road, crossing under I-481 bridges at approximately Station H6A 14+50

A-2.1.5 Windstream

Aerial telecommunication lines located at the following locations on I-481, Routes 5 & 92 Interchange, Lyndon Corners:

- Along Routes 5 and 92 (E. Genesee Street) from approximately Station S6C 101+00 to Station S6C 107+50 RT

A-2.2 Electric

A-2.2.1 National Grid

Aerial facilities at the following locations ~~at the on~~ I-81 / I-481 South Interchange:

- Crossing I-481 along the west side of East Brighton Avenue Bridge from approximately Station S4D 104+75 to Station S4D 119+50
- Crossing East Brighton Avenue at approximately Station S4C 104+~~5025~~
- Two transmission lines crossing I-481 located at approximately Station H2 61+45 and Station H2 61+~~9575~~
- Two lines crossing I-481 located at approximately Station H2 70+~~4050~~ and Station H2 70+80
- Crossing ~~R~~Relocated East Glen Road at approximately Station S4B 10+~~6050~~
- Crossing Business Loop 81 at approximately Station R2A 46+75 and crossing the new on and off ramps located on the north side of the East Glen Bridge

Aerial facilities at the following locations on I-481, I-690 to Kirkville Road:

- Crossing under I-481 northbound and southbound bridges over CSX Railroad located at approximately Station H6A 32+25 and H6C 39+48

Aerial facilities at the following locations ~~at the on~~ I-481/~~I~~-E. Genesee Street Interchange:

- Crossing I-481 Northbound at approximately Station R6B 123+75
- Crossing I-481 Northbound at approximately Station R6B 124+~~2503~~
- Crossing I-481 south of Kinne Road at approximately Station R6B 128+47
- Crossing I-481 north of Kinne Road at approximately Station R6B 129+~~60X74~~
- ~~Crossing I-481 Northbound from Station R6B 128+50 to Station R6B 134+00 on the eastern side of highway~~
- ~~Crossing I-481 Southbound from Station R6B 128+50 to Station R6B 134+00 on the western side of highway~~
- Crossing I-481 at approximately Station R6B 134+10
- Crossing I-481 Southbound from Station R6A 35+00 to Station R6A 27+00 at the western side of the southbound off ramp.
- Along the south sides of Routes 5 & 92 from approximately Station S6A 8+50 to Station S6A ~~1123~~+00
- ~~Along the south sides of Routes 5 & 92 from Station S6A 11+00 to Station S6A 23+00~~
- Crossing Routes 5 & 92 at approximately Station S6A 14+75 and Station S6A 15+~~2000~~

New York State Department of Transportation

- The facilities that cross the highway are 115 KV and 345 KV high voltage lines. National Grid will need 24 hour/ 7 day a week access to these lines.

Aerial facilities at the following locations at NYS Routes 5 & 92 Intersection (Lyndon Corners):

- Crossing Routes 5 & 92 at approximately Station S6C 102+60
- Along the south sides of Routes 5 & 92 from approximately Station S6C 100+80 to Station S6C 107+80
- Crossing Route 92 ~~at approximately~~ from Station S6C 107+80 ~~and to~~ Station S6C 110+50
- Along the north sides of Routes 5 & 92 from approximately Station S6C 110+50 to Station S6C 120+00

Underground facilities at the following locations on I-81 / I-481 South Interchange:

- Two lines crossing I-81 approximately at Station R3A 93+50 by E. Seneca Turnpike
- ~~• Crossing I-81 Southbound from Station R3A 125+50 to Station R3A 144+00~~
- ~~• Crossing I-81 Northbound from Station R2A 52+40 to Station R2A 73+75~~
- ~~• Crossing I-81 approximately at Station R2A 66+75~~
- ~~• Crossing I-81 along Colthrup Road approximately at Station R2A 76+00~~

A-2.3 Natural Gas

A-2.3.1 National Grid

Gas facilities in the following locations ~~at the on~~ I-81 / I-481 South Interchange:

- Crossing I-81 along E. Glen Avenue at approximately Station R3A ~~118+50~~ 119+25
- ~~Along~~ Crossing existing E. Brighton Ave. at approximately Station S4D 119+00 LT
- Crossing I-81 along E. Seneca Turnpike at approximately Station R3A 93+50

Gas facilities in the following locations ~~at the on~~ I-481 / E. Genesee Street Interchange:

- Along the southern side of Routes 5 & 92 from approximately Station S6A 8+50 to Station S6A 10+75

Gas facilities located at NYS Route 5 and NYS Route 92 Intersection (Lyndon Corners)

- Along the southern side of Routes 5 & 92 from approximately Station S6C 101+22 to Station S6C 113+90

A-2.4 Water

A-2.4.1 Onondaga County Water Authority (OCWA)

Water facilities located at the I-81 / I-481 Southern Interchange:

- 24" water main located on I-481 Southbound exit ramp at approximately Station R4A 125+75
- 24" water main located on the eastern side of East Brighton Ave. Bridge from approximately Station S4C 106+00~~104+50~~ to S4C 114+75~~113+50~~

Water facilities located on I-481 between I-690 to Kirkville Road:

- 10" water main located along Manlius Center Road under existing I-481 Northbound and Southbound bridges
- 16" water main (abandoned) along CSX rail yard under existing I-481 Northbound and Southbound bridges
- 24" water main (conc) under existing I-481 Northbound and Southbound bridges over CSX rail yard at approximately Station H6C 31+00
- 16" water main (DIP) under the existing I-481 Northbound and Southbound bridges over CSX rail yard at approximately Station H6A 43+00

A-2.4.2 City of Syracuse

Water facilities located at the I-81 / I-481 Southern Interchange:

- 8" water main located on East Glen Ave. Bridge over I-81 at approximately Station R3A 118+50~~9+25~~
- 12" water main located on East Brighton Ave Bridge at approximately Station S4C 100+75 to Station S4C 118+75-
- 10" water main located along Seneca Turnpike under I-81 Northbound and Southbound Bridges.

A-2.4.2A-2.4.3 Town of Dewitt

Water facilities located at ~~NYS Route 5/92 through existing I-481~~ E. Genesee St. Exit 3E and 3W, Future I-81 Interchange:

- Unknown size water main along the south side of Genesee Street crossing at approximately Station S6A 11+60

New York State Department of Transportation

- Fire hydrant located on the south side of Genesee Street located at approximately Station S6A 10+55 RT.
- Unknown size water main located along the north side of Genesee Street from approximately Station S6A 7+60 to Station S6A 13+00 LT
- Unknown size water main located along the south side of Genesee Street from approximately Station S6A 7+60 to Station S6A 22+50 RT

Water facilities located at NYS Route 5 and ~~NYS Route 92~~ Intersection (Lyndon Corners):

- Unknown size water main located along the south side of Genesee Street at approximately Station S6C 100+00 to Station S6C 109+00 RT
- Unknown size water main located along the north side of Genesee Street at approximately Station S6C 107+40 to Station S6C 108+50 LT
- Unknown size water main located along the south side of Highbridge Road (NYS Route 92) from approximately Station S6C 109+00 to Station S6C 114+25 RT
- Fire Hydrant located on the south side of Highbridge Road (NYS Route 92) at approximately Station S6C 112+75 RT

A-2.5 Sanitary

A-2.5.1 Onondaga County Department of Water Environment Protection (OCDWEP) Sanitary Sewer facilities located at I-81 / I-481 Southern Interchange:

- 24" Sanitary Sewer crossing I-81 Northbound at approximately Station R2A 63+50

~~Sanitary Sewer facilities located on NYS Route 5/92 through existing I-481 Exit 3E and 3F, Future I-81 Interchange~~

- ~~• 12" Sanitary Sewer located along the north side of Genesee Street~~

Sanitary Sewer facilities located on I-481 between NYS Route 5 Interchange and I-690:

- 10" Sanitary Sewer crossing I-481 Northbound and Southbound at approximately Station R6B 130+00
- 36" Sanitary Sewer crossing I-481 Northbound and Southbound at approximately Station R6B 132+50

Sanitary Sewer facilities located I-481/E. Genesee St. Interchange:

- 12" Sanitary Sewer located along the north side of Genesee Street from approximately Station S6A 7+50 to Station S6A 13+07 LT
- Unknown size Sanitary Sewer located along the south side of Genesee Street from approximately Station S6A 10+86 to Station S6A 13+07 RT
- 36" Sanitary Sewer crossing Genesee Street at approximately Station S6A 13+07

Sanitary Sewer facilities located at NYS Route 5 and ~~NYS~~ Route 92 Intersection (Lyndon Corners):

- 8" Sanitary Sewer located along the north side of Genesee Street from approximately Station S6C 100+00 to Station S6C 108+00 LT
- ~~8" Sanitary Sewer located along the south side of Genesee Street~~
- Unknown size Sanitary Sewer located along the north side of Highbridge Road (NYS Route 92) from approximately Station S6C 109+00 to Station S6C 119+50 LT
- Unknown size Sanitary Sewer crossing Highbridge Road (NYS Route 92) at approximately Station S6C 12+45

A-2.5.2 City of Syracuse (Sanitary)

Sewer facilities located at I-81/ I-481 Southern Interchange:

- 10" Sanitary Sewer located along Seneca Turnpike under I-81 Northbound and Southbound Bridges.
- 12" Sanitary Sewer crossing I-81 Northbound and Southbound at approximately Station R2A 53+15

A-2.6 Utility Service Connections

List any utility services / connections of concern.

A-2.7 Street Lighting

A-2.7.1 Town of Dewitt

Street Lighting located at ~~NYS Route 5/92 through existing I-481/E. Genesee St. Exit 3E and 3W, Future I-81~~ Interchange:

- Street lighting located at approximately sStation S6A ~~11+60~~12+40 RT to Station S6A 22+5619+20 LT:
- Street lighting located at approximately Station S6A 11+90 to Station S6A 22+56 RT

Street Lighting located at NYS Route 5 and NYS Route 92 intersection (Lyndon Corners):

- Street lighting located in the Lyndon Corners area at approximately sStation S6C 101+00 to Station S6C ~~107+50~~109+00 RT:

A-2.7.2 City of Syracuse

Street lighting located at the I-481/ I-81 ~~South~~ Interchange:

- Street lighting located along East Seneca Turnpike under I-81 Northbound and Southbound Bridges
- Street lighting located along the western side of East Brighton Avenue from approximately Station S4D 105+50 to Station S4D 113+25 LT. and Station S4D 117+00 to Station S4D 119+75 LT
- Street lighting located along the eastern side of East Brighton Avenue from approximately Station S4C 106+60 to Station S4C 115+50 RT
- Street lighting along I-81 Southbound from approximately Station R3A 125+50 to Station R3A 144+00
- Street lighting along I-81 Northbound from approximately Station R2A 52+40 to Station R2A 73+75
- Underground electric crossing I-81 approximately at Station R2A 66+75
- Underground electric crossing I-81 along Colthrup Road at approximately Station R2A 76+00

A-3 UTILITY RELOCATIONS BY OTHERS

The Design-Builder shall be aware that all time frames for utility relocation work presented in this section are approximate and are predicated on the assumption of a single relocation to the new, permanent utility locations. Should the Design-Builder's design, means and methods require interim utility relocations, the Design-Builder shall be responsible for coordinating with the affected utilities to determine the time frames required for any and all interim relocations.

A-3.1 Telecommunications

A-3.1.1 Verizon of New York

Aerial facilities in conflict at the following locations on I-481, I-690 to Kirkville Road:

- Verizon will install its facilities underground and remove their aerial lines that are located along Manlius Center Road, crossing under I-481 bridges at approximately Station H6A 14+50. Verizon will need 2 to 3 months to do this work.

Aerial facilities in conflict at the following locations ~~at~~ I-481/E. Genesee St., Routes 5 & 92 Interchange, ~~Lyndon Corners~~

- Verizon will relocate aerial facilities located along Routes 5 and 92 from approximately Station S6A 9+38 ~~10+00~~ to Station S6A 10+45 RT ~~11+00~~. Verizon will need 4 months to do work at this location.

Aerial facilities in conflict at the following locations on I-481, Routes 5 & 92 Interchange (Lyndon Corners)

New York State Department of Transportation

- Verizon will relocate aerial facilities located along Routes 5 and 92 from approximately Station S6C 102+~~6340~~ to Station S6C 105+00. Verizon will need 2 to 3 weeks to transfer their lines and execute pole removals in this area.

Underground facilities in conflict at the following locations on I-81 / I-481 South Interchange:

- Verizon will relocate its Duct Bank that is located over I-81 on E. Glen bridge crossing at approximately Station R2A 46+00. Verizon will need 2 to 3 months to do the relocation work at this location. Verizon will relocate their new lines to the new East Glen bridge which will be located south of the existing bridge.

A-3.1.2 Charter Communications

Aerial cable TV lines in conflict at the following locations on I-81 / I-481 South Interchange:

- Charter will relocate lines adjacent to Brighton Ave, ~~approximately~~ at approximately Station S4D ~~110+00~~~~107+40~~ to S4D ~~117+00~~ LT02+25. Charter will take 8 weeks to complete their work at this location.

Aerial cable TV lines in conflict at the following locations on I-481, I-690 to Kirkville Road:

- Charter will install its facilities underground and remove their aerial lines that are located along Manlius Center Road, crossing under I-481 bridges at approximately Station H6A 14+50. Charter will take one month to complete the work at this location.

Aerial cable TV lines in conflict at the following locations ~~at~~~~on~~ I-481, Routes 5 & 92 Intersectionchange, (Lyndon Corners):

- Charter will relocate aerial facilities located along Routes 5 and 92 from approximately Station S6C 102+~~631+00~~ to Station S6C ~~105+00~~~~7+50~~. Charter will take 2 weeks to complete the relocation work at this location.

A-3.1.3 First Light Fiber, Inc.

Aerial Communications Lines in conflict at the following locations on I-481, I-690 to Kirkville Road:

- First Light Fiber will Relocate aerial facilities under I-481 over Manlius Center Road, crossing under the I-481 bridges at approximately Station H6A 14+50, to an underground line which will be placed in 4" HDPE conduit. Conduit will be installed by directional boring. The conduit will go underground between National Grid pole "NG34" on the west side of the I-481 bridge to the pole numbered "NG37" located on the east side of the I-481 bridge. First Light will remove the aerial fiber optic lines that are in conflict located between the two said poles, approximately 408 feet.

A-3.1.4 Crown Castle

Aerial Communications Lines in conflict at the following locations on I-481, I-690 to Kirkville Road:

- Crown Castle will Relocate aerial facilities under I-481 over Manlius Center Road, crossing under the I-481 bridges at approximately Station H6A 14+50, to an underground line placed in conduit. The conduit will go underground between National Grid pole “NG34” on the west side of the I-481 bridge to the pole numbered “NG37” located on the east side of the I-481 bridge. Crown Castle will remove the aerial fiber optic lines that are in conflict located between the two said poles, approximately 408 feet.

A-3.1.5 Windstream Communications

Aerial Communications Lines in conflict at the following locations ~~at~~ on I-481, Routes 5 & 92 Inter~~section~~change, (Lyndon Corners):

- Relocate aerial facilities located along Routes 5 and 92 from approximately Station S6C 101+00 to 107+50 RT.

A-3.2 Electric

A-3.2.1 National Grid Electric

Aerial facilities in conflict at the following locations on I-81 / I-481 South Interchange:

- National Grid will relocate aerial facilities crossing I-481 along the west side of East Brighton Avenue Bridge from approximately Station S4D 104+75 to Station S4D 119+50
- National Grid will relocate aerial facilities crossing East Brighton Avenue at approximately Station S4C 104+25
- National Grid will relocate aerial facilities crossing relocated East Glen Road at approximately Station S4B 10+50
- National Grid will relocate aerial facilities crossing Business Loop 81 at approximately Station R2A 46+75 and crossing the new on and off ramps located on the north side of the East Glen Bridge
- National Grid will need 6 weeks to do their work in these areas

Aerial facilities in conflict at the following locations on I-481, I-690 to Kirkville Road:

- National Grid will relocate its aerial facilities currently crossing under I-481 northbound and southbound bridges over CSX Railroad located at approximately Station H6A 32+25 and H6C 39+48 to underground. National Grid will also relocate two poles. National Grid will need 4 weeks to complete their work at this location.

Aerial facilities in conflict at the following locations on I-481/ E. Genesee Street Interchange:

- National Grid will relocate aerial facilities and two poles located along the south sides of Routes 5 & 92 from approximately Station S6A ~~9+38~~10+00 to Station S6A ~~10+45~~ RT1+00

New York State Department of Transportation

- National Grid will relocate aerial facilities and three poles located along the south sides of Routes 5 & 92 from approximately Station S6C 102+40 to Station S6C 105+10 and crossing Routes 5 & 92 at approximately Station S6C 102+60
- ~~National Grid will relocate aerial facilities and three poles located along the south sides of Routes 5 & 92 from Station S6C 102+40 to Station S6C 105+00~~
- National Grid will need 2 weeks to complete their work at these locations.

Underground facilities in conflict at the following locations on I-81 / I-481 South Interchange:

- National Grid will relocate underground facilities located along crossing I-81 Southbound from approximately Station R3A 125+~~60~~50 to Station R3A 138+50 LT44+00
- National Grid will relocate underground facilities located along crossing I-81 Northbound from approximately Station R2A 52+40 to Station R2A ~~73+75~~65+60 RT
- National Grid will need 2 weeks to complete their relocation work at these locations.

A-3.3 Natural Gas

A-3.3.1 National Grid

Gas facilities in conflict at the following locations on I-81 / I-481 South Interchange:

- National Grid will relocate their gas facilities crossing I-81 along E. Glen Avenue at approximately Station R3A 11~~8+50~~9+25. National Grid will need 6 weeks to complete their work at this location.
- ~~National Grid will relocate their gas facilities located along E. Brighton Ave. at Station S4D 119+00. National Grid will need 6 weeks to complete their work at this location.~~

Gas facilities in conflict at the following locations on I-481 / E. Genesee Street Interchange:

- National Grid will relocate their gas facilities located along the southern side of Routes 5 & 92 from approximately Station S6C 101+22 to Station S6C 109+50. National Grid will need 2 to 3 weeks to relocate facilities at this location.
- ~~National Grid will cut and cap and therefore abandon their gas facilities located along the southern side of Routes 5 & 92 from Station S6C 113+00 to Station S6C 113+90. National Grid will need 1 day to complete their work at this location.~~

A-3.4 Water

A-3.4.1 Onondaga County Water Authority

No utility relocations anticipated.

A-3.4.2 City of Syracuse

No utility relocations anticipated.

A-3.5 Sanitary

A-3.5.1 Onondaga County Department of Water Environment Protection (OCDWEP)

No utility relocations anticipated.

A-3.5.2 City of Syracuse (Sanitary)

No utility relocations anticipated.

A-4 UTILITY RELOCATIONS BY THE DESIGN-BUILDER

The Design-Builder shall be responsible for coordinating the relocation of all utility services which are impacted by the Project, including the maintenance and protection of those utilities not listed below, participation in all meetings, preparing minutes of meetings, performing plan reviews, ground preparation, performing survey and mark out required for utility relocations as well as excavating test pits as necessary to facilitate resolution of design utility conflict tables to final conflict resolution tables. The following sections describe the anticipated Work to be performed and coordination required with each utility owner.

A-4.1 Telecommunications

A-4.1.1 Verizon

No utility relocation work anticipated.

A-4.1.2 Charter Communications

No utility relocation work anticipated.

A-4.2 Electric

A-4.2.1 National Grid

No utility relocation work anticipated.

A-4.3 Natural Gas

A-4.3.1 National Grid

No utility relocation work anticipated.

A-4.4 Water

A-4.4.1 Onondaga County Water Authority (OCWA)

Water facilities in conflict located at I-81 / I-481 Southern Interchange:

- Design-Builder will relocate a 24" water main located on the eastern side of East Brighton Ave. Bridge from approximately Station S4C 106+00 to S4C 115+004+80. This line shall remain in service at all times.

A-4.4.2 Town of Dewitt

Water facilities in conflict located at ~~NYS Route 5/92 through existing I-481/E. Genesee St. Exit 3E and 3W, Future I-81~~ Interchange:

- Design-Builder will relocate a fire hydrant located on the south side of Genesee Street located at approximately Station S6A 10+55 RT.

Water facilities in conflict located at NYS Route 5 and ~~NYS Route 92~~ Intersection (Lyndon Corners):

- Design-Builder will relocate a fire hydrant located on the south side of Highbridge Road (NYS Route 92) at approximately Station S6C 112+75 RT

A-4.4.3 City of Syracuse

Water facilities in conflict located at I-81 / I-481 Southern Interchange:

- Design-Builder will replace the existing 8" water main located on East Glen Ave. Bridge over I-81, at approximately Station R3A 11~~8+509+25~~, with a new 12" main along relocated E. Glen Avenue. The existing 8" line shall remain in service at all times, until the new 12" main is in service. The Design-Builder will provide and install a new meter pit on the west side of the new bridge over future BL 81 and a new 12" water main along relocated E. Glen Avenue, connecting to the relocated 12" water main on E. Brighton Avenue. The new meter pit shall be located within the highway boundary or permanent easement area, location to be determined by City of Syracuse Water Department. The work will include reconnecting the existing private water mains on Loretto property to the new meter pit. The work shall also include installing 2 new fire hydrants, one on either side of the new bridge over BL 81.
- The water meter pit shall be designed:
 - To be watertight ~~with watertight manholes or access doors extending a minimum of 6 inches above grade~~ and located to allow natural light into the pit during testing/maintenance.
 - ~~With stairways, ladders, or step irons~~
 - ~~For crane access for installing and removing large assemblies.~~
 - With adequate horizontal and vertical clearances to allow access to the device.
 - ~~With a full flow screened gravity drain terminating above grade for all RPZ installations~~
 - ~~With sump pumps or gravity daylight drains for all DVCA installations.~~
 - With floors pitched to drain.
 - ~~With adequate ground cover to prevent freezing.~~
 - With surface grading to divert runoff away from the pit~~entrance way~~.

Refer to Part 5, SP-18 for Drop Over Enclosure and Backflow Prevention details~~Semi-buried pits for berm installations may be necessary to satisfy gravity drainage requirements.~~

- Once the new 12" main feeding Loretto is operational, the existing 8" main on existing E. Glen Avenue will be cut just east of the existing bridge, and a new fire hydrant will be installed. There is an existing service tee in this area that must remain in service.
- Design-Builder will relocate a 12" water main located on East Brighton Ave Bridge. The existing water main shall remain in service at all times, except for a maximum 4-hour window (subject to City Water Department approval) to connect the new main to the existing main. At a minimum, the existing main will be replaced between approximatelyly

New York State Department of Transportation

~~s~~Stations S4D 102+80 and Station S4D 118+00. The work shall also include installing new fire hydrants and water valves as follows:

- A new fire hydrant on both sides of the new bridge over I-81.
- A new fire hydrant at the intersection of Brighton Avenue/Relocated E. Glen Avenue
- Additional fire hydrants and water valves, as necessary, to provide for a maximum 300' spacing. Contact City of Syracuse Water Department to coordinate installation locations.

Refer to Part 5 SP-18 for City of Syracuse details and requirements related to this work.

A-4.5 Sanitary

A-4.5.1 Onondaga County Department of Water Environment Protection (OCDWEP)

Storm Sewer facilities in conflict located on I-481, E. Genesee Street – Kirkville Road:

- Design-Builder will relocate a 24" Storm sewer along Interstate 481 at approximately Stations H6A 21+40 to H6A 22+20
- Design-Builder will relocate a 24" Storm sewer crossing I-481 Southbound at approximately Station H6E 14+682+29
- Design-Builder will relocate a 24" Storm sewer crossing I-481 Southbound at approximately Station H6E 27+575+15-LT
- Design-Builder will relocate a 3'x5' Storm sewer consisting of twin pipes crossing I-481 Southbound at approximately Station H6E 16+7523+10
- Design-Builder will relocate a 36" Storm sewer crossing I-481 Northbound at approximately Station H6B 14+42, ~~unknown-size~~

Storm Sewer facilities in conflict located at I-481 / East Genesee Street Interchange:

- Design-Builder will relocate Various Storm Sewers located within the Exit 3 Interchange

Storm Sewer facilities in conflict located at I-81 / I-481 Southern Interchange:

- Design-Builder will relocate Various Storm Sewers located throughout the Southern Interchange

A-4.5.2 City of Syracuse (Sanitary)

No utility relocation work anticipated.

A-4.6 Street Lighting

A-4.6.1 Town of Dewitt

Street lighting in conflict located at ~~the NYS Route 5/92, through existing I-481/E. Genesee St. Exit 3E and 3W, Future I-81~~ Interchange:

- The Design-Builder will replace ~~67~~ street lights from ~~approximately s~~Station S6A 12+40 ~~RT~~ to Station S6A 19+20 RT and 1 street light from approximately Station S6A 16+40 LT.

Street lighting in conflict located at NYS Route 5 and ~~NYS Route~~ 92 Intersection (Lyndon Corners):

- The Design-Builder will replace 2 street light poles from ~~approximately s~~Station S6C +/- 105+00 to ~~s~~Station S6C 107+75 ~~RT~~.

A-4.6.2 City of Syracuse

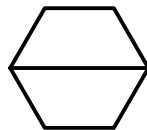
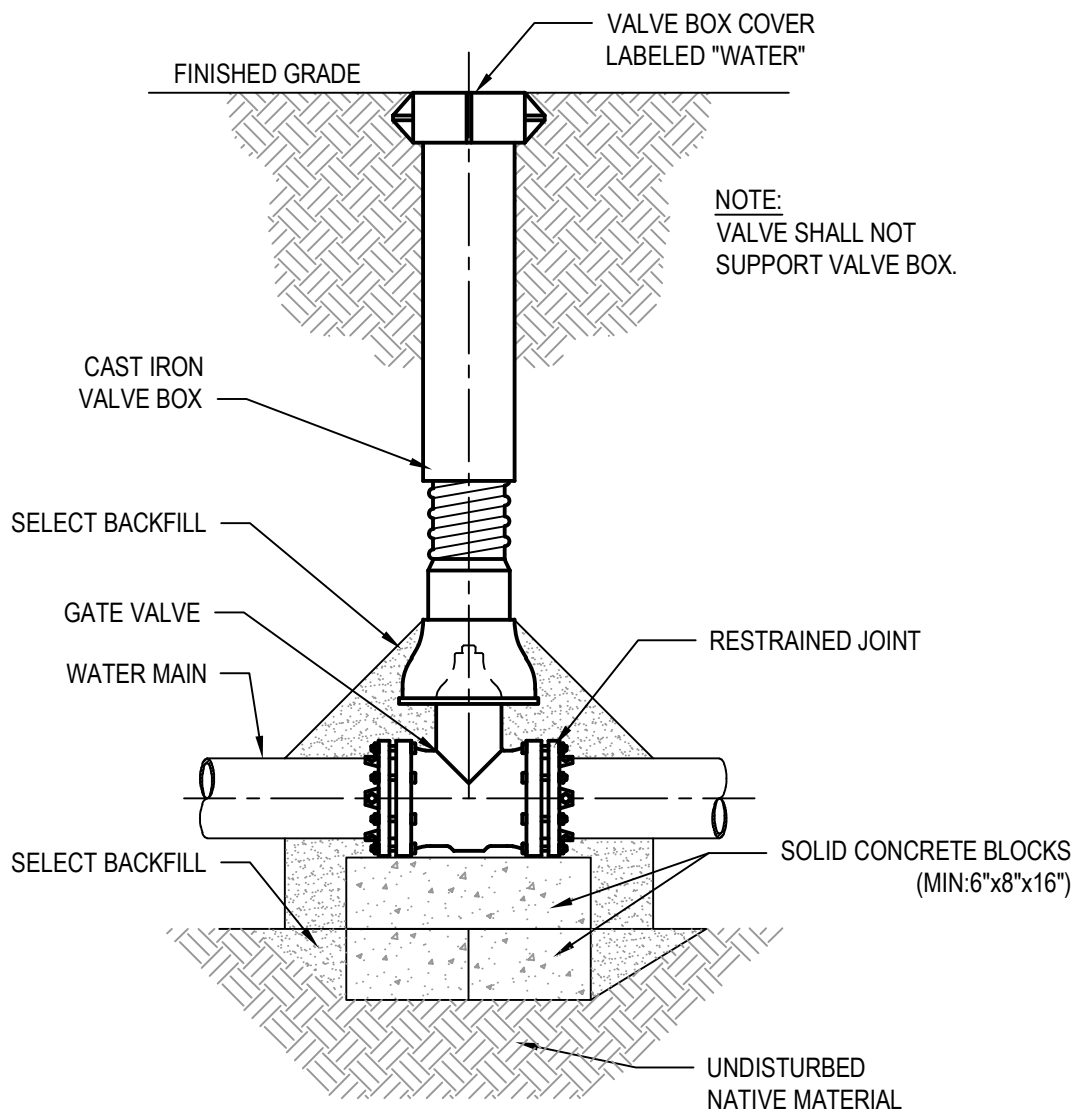
Street lighting facilities ~~at I-81 / I-481 Southern Interchange: on Brighton Ave between E. Glen Ave and the Brighton Towers Apartment driveway~~

- The Design-Builder will replace 18 poles on Brighton Ave from approximately Station S4D 101+75 to Station S4D 118+25 LT. and approximately Station S4C 101+25 to Station S4C 115+50 RTE. Glen Ave to the Brighton Towers Apartments driveway.
- ~~Street lighting facilities on East Seneca Turnpike~~
- The Design-Builder will replace 1 pole on East Seneca Turnpike where proposed I-81 NB crosses East Seneca Turnpike at approximately Station H2 32+35 LT.
- The Design-Builder will replace 7 poles and associated lighting conduit along existing I-81 NB from approximately Station R2A 52+40 to Station R2A 63+75 RT
- The Design-Builder will replace 7 poles and associated lighting conduit along existing I-81 SB from approximately Station R3A 125+60 to Station R3A 136+40 LT

A-5 DESIGN BUILD UTILITY DOCUMENTS

The Design-Builder shall provide documentation regarding the coordination and locations of the impacted utilities to the Department's Project Manager, and the Department's Project Manager shall coordinate with Regional Utility Engineer. The required documents are: utility conflict/resolution table with proposed locations, utility plans, and Special Note of Utility Coordination.

The documentation shall be used to secure the Final DB Utility Work Agreements (DB-HC140) with each impacted utility company and any required Municipal Agreements.



GATE VALVE ASSEMBLY DETAIL

NOT TO SCALE

IT IS VIOLATION OF NEW YORK STATE EDUCATION LAW FOR ANY PERSON, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER AN ITEM ON THIS DRAWING IN ANYWAY. IF AN ITEM IS ALTERED, THE ALTERING ENGINEER SHALL AFFIX TO THE ITEM HIS/HER SEAL AND THE NOTATION "ALTERED BY" FOLLOWED BY HIS/HER SIGNATURE AND DATE OF SUCH ALTERATION AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

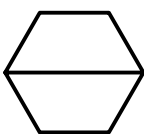
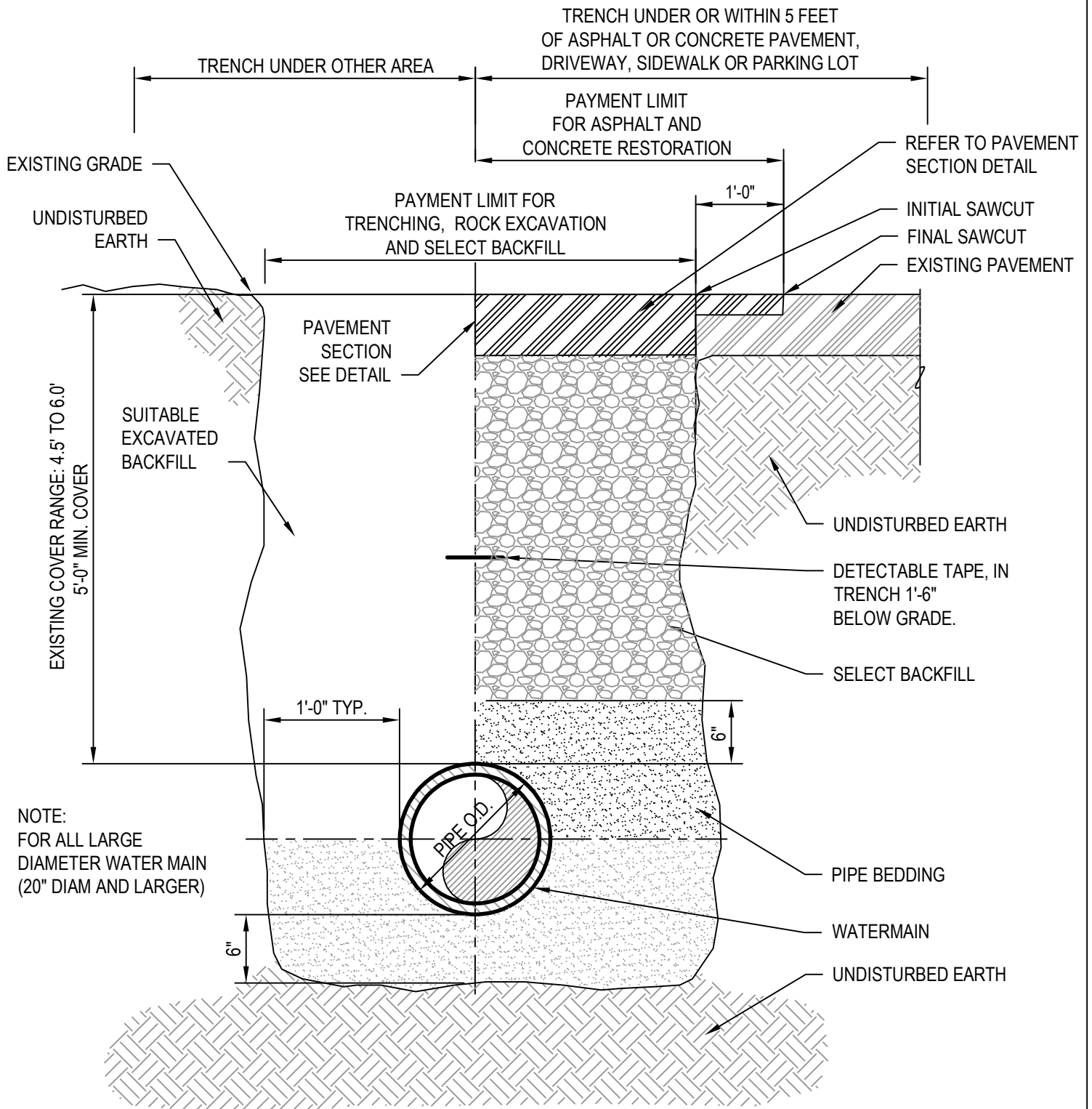
CITY OF SYRACUSE
DEPARTMENT OF WATER

101 N. BEECH ST. SYRACUSE, NY 13210



GATE VALVE ASSEMBLY
DETAIL

W-01



TRENCH THROUGH 16" DIAM. PIPE DETAIL

NOT TO SCALE

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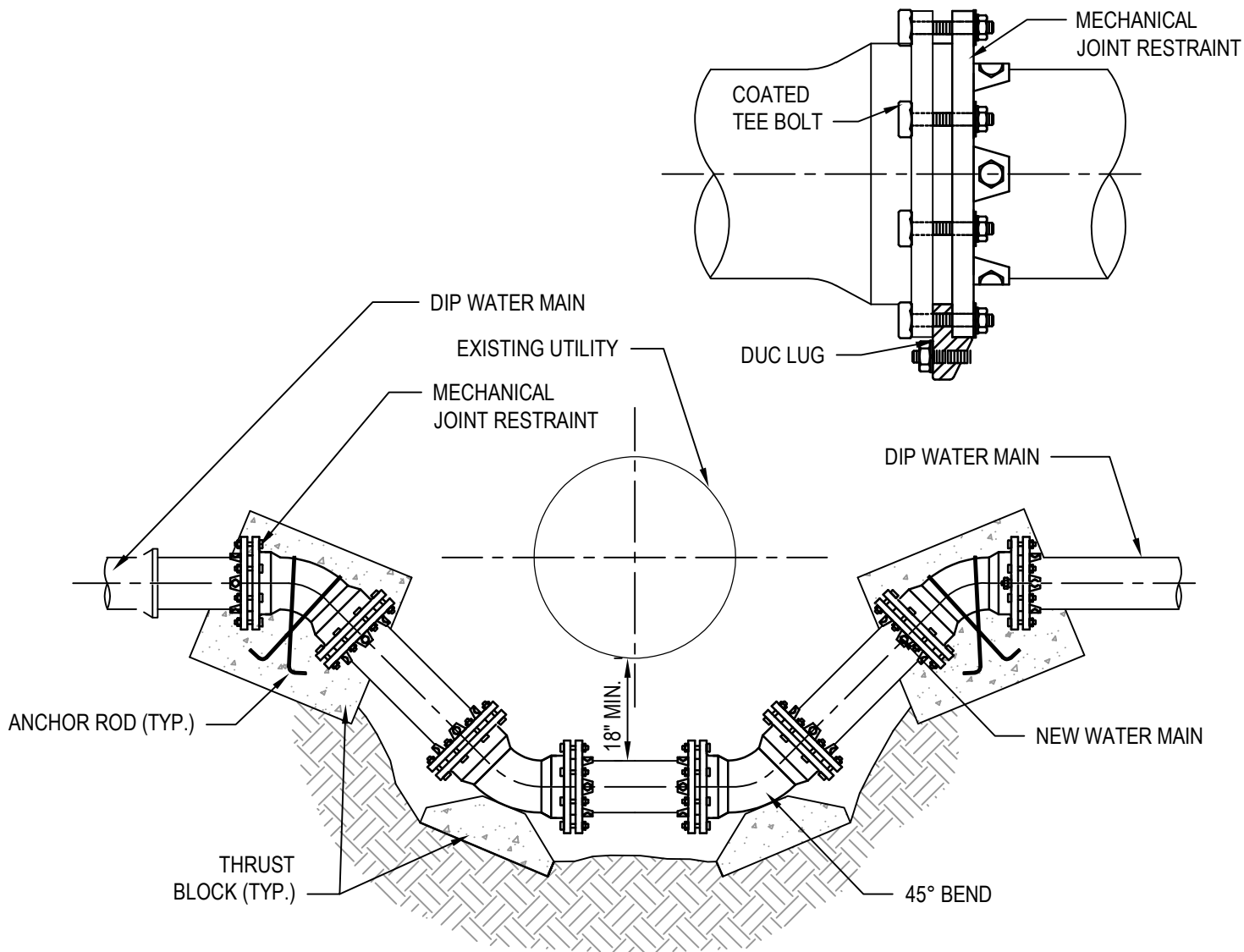
CITY OF SYRACUSE
DEPARTMENT OF WATER

101 N. BEECH ST. SYRACUSE, NY 13210



TRENCHING DETAIL

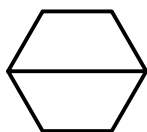
W-02



SECTION NTS

NOTES:

1. RESTRAINED MECHANICAL JOINTS AS SHOWN.
2. VALVES, TEES AND HYDRANTS MAY BE RESTRAINED SIMILARLY.
3. ONE FULL PIPE LENGTH SHALL BE CENTERED UNDER THE EXISTING UTILITY CROSSING.
4. WATER MAIN JOINTS SHALL BE PLACED EQUIDISTANT FROM THE EXISTING UTILITY AT THE CROSSING..
5. IF EXISTING PIPE IS CIP CONNECT TO NEW FITTING ONLY WHEN ALLOWED BY ENGINEER.



WATER MAIN RELOCATION DETAIL (TYP.)

NOT TO SCALE

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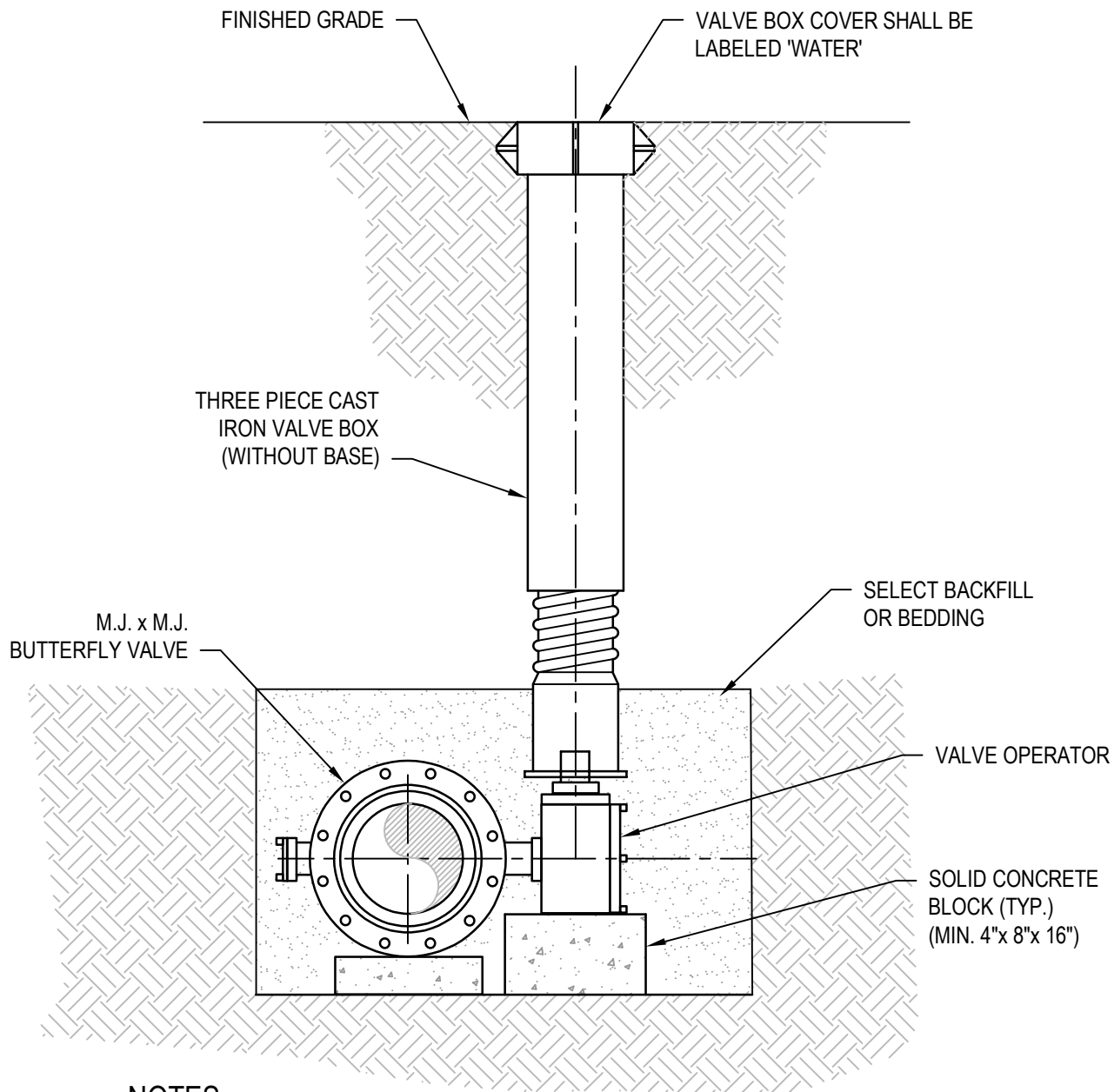
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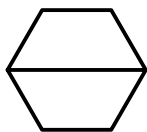
WATER MAIN RELOCATION
DETAIL

W-03



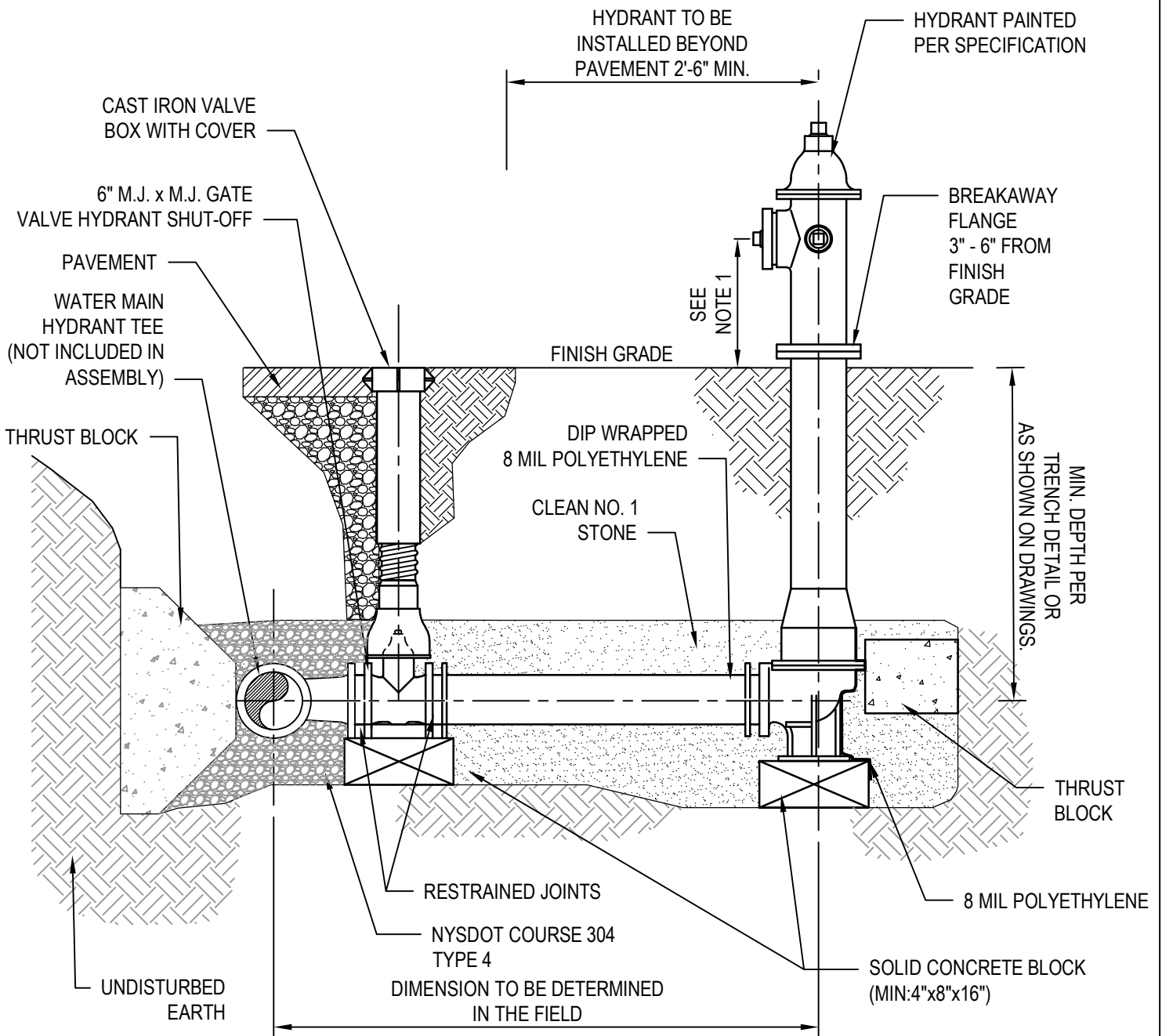
NOTES:

1. VALVE SHALL NOT SUPPORT VALVE BOX.
2. POSITION VALVE SO THAT OPERATOR IS ON SIDE OF WATER MAIN OPPOSITE THE ϵ OF ROADWAY.
3. VALVE 16" OR LARGER SHALL BE A BUTTER FLY VALVE UNLESS OTHERWISE IDENTIFIED BY OWNER



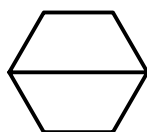
BUTTERFLY VALVE INSTALLATION (TYP.)

NOT TO SCALE



NOTES:

1. CENTERLINE OF THE LOWEST NOZZLE TO FINISHED GRADE SHALL BE A MIN. OF 24" & MAX. OF 30".
2. HYDRANT RISER SHALL BE INSTALLED PLUMB.
3. HYDRANT LATERAL LONGER THAN 6'-6", SHALL BE PAID UNDER THE PAYMENT ITEM NO. PI-W1.1 OR PI-W2.1



FIRE HYDRANT ASSEMBLY INSTALLATION (TYP.)

NOT TO SCALE

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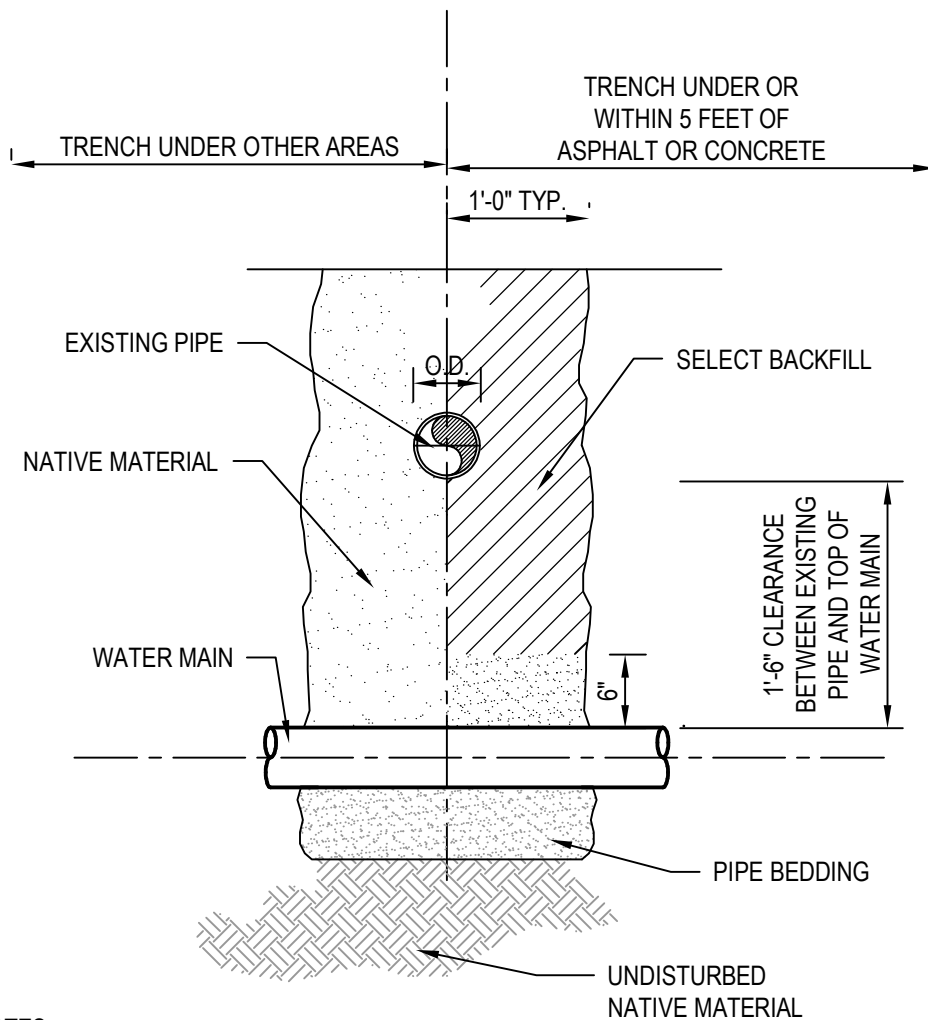
**CITY OF SYRACUSE
DEPARTMENT OF WATER**

101 N. BEECH ST. SYRACUSE, NY 13210



**HYDRANT ASSEMBLY
INSTALLATION DETAIL**

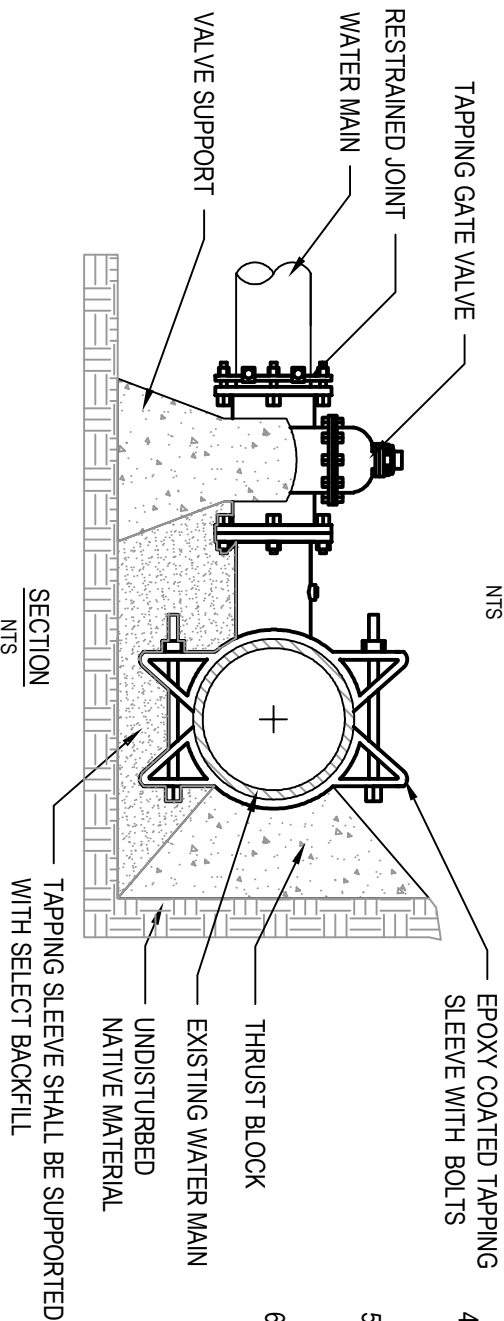
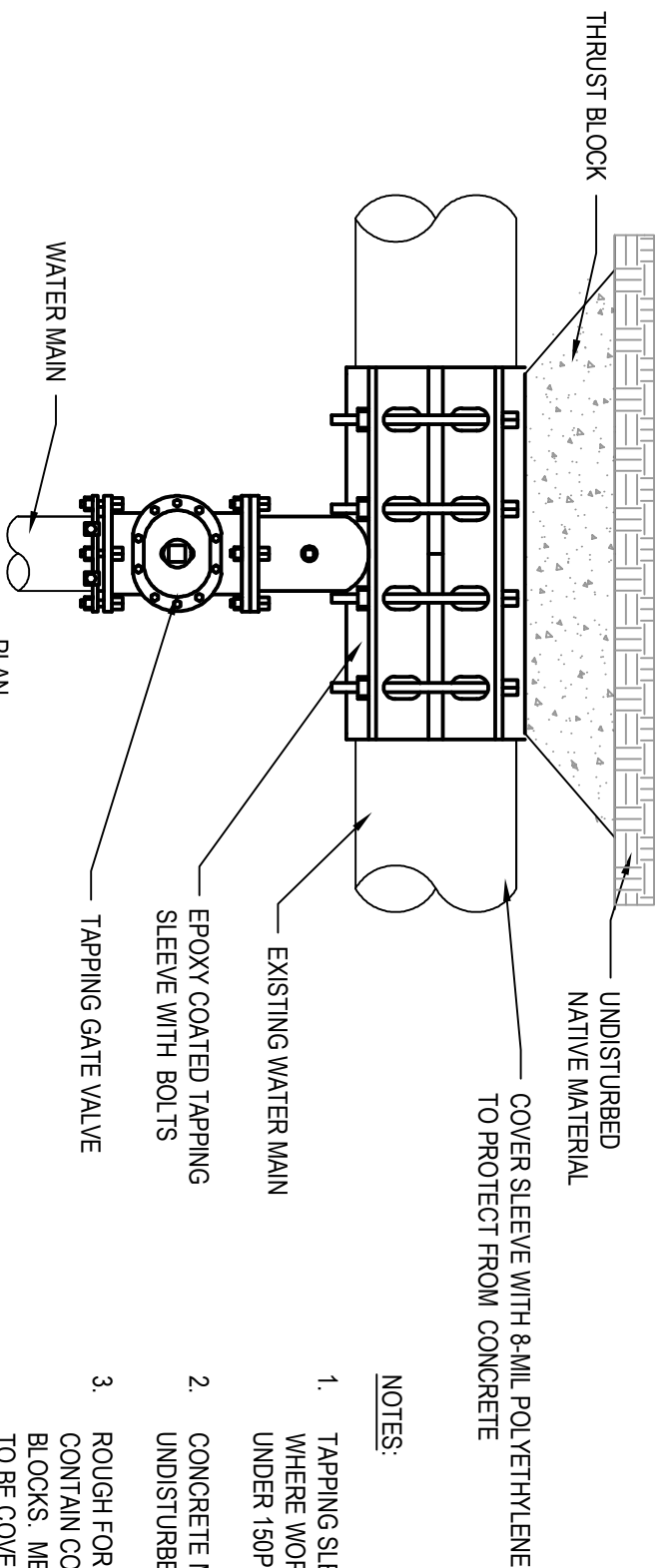
W-05



NOTES:

1. ALL EXISTING UTILITIES MUST BE SUPPORTED DURING CONSTRUCTION OF THE NEW WATER MAIN.
2. WHEN CROSSING A SEWER LINE WITH A NEW WATER MAIN, ONE FULL PIPE LENGTH (18 FT. MIN.) SHALL BE USED AT THE POINT OF CROSSING. THE WATER MAIN SHALL BE PLACED SO THAT BOTH JOINT ENDS ARE AS FAR AS POSSIBLE FROM THE EXISTING SEWER LINE.
3. WHENEVER REQUIRED VERTICAL CLEARANCE CAN NOT BE OBTAINED, THE SEWER SHALL BE ENCASED IN CONCRETE FOR A DISTANCE OF 10' EITHER SIDE OF THE INTERSECTION WITH THE WATER MAIN AS INSTRUCTED BY THE ENGINEER. CLEARANCE REQUIREMENTS SHALL BE THE RECOMMENDED STANDARDS FOR WATER WORKS. ALSO REQUIRED IS A 10' MINIMUM HORIZONTAL SEPARATION BETWEEN SEWERS AND WATER MAINS





NOTES:

1. TAPPING SLEEVE IS APPROVED FOR USE WHERE WORKING PRESSURES ARE UNDER 150PSI.
2. CONCRETE MUST BEAR UPON UNDISTURBED NATIVE MATERIAL
3. ROUGH FORMS SHALL BE USED TO CONTAIN CONCRETE FOR THRUST BLOCKS. MECHANICAL JOINTS ARE NOT TO BE COVERED.
4. ALLOW POURED CONCRETE THRUST BLOCKS TO SET PRIOR TO BACKFILLING.
5. ALL PIPE AND FITTINGS TO BE WRAPPED POLYETHYLENE ENCASEMENT.
6. ALL FITTINGS ARE TO BE MECHANICALLY RESTRAINED

TAPPING SLEEVE (LIVE TAP) WITH THRUST BLOCK

NOT TO SCALE

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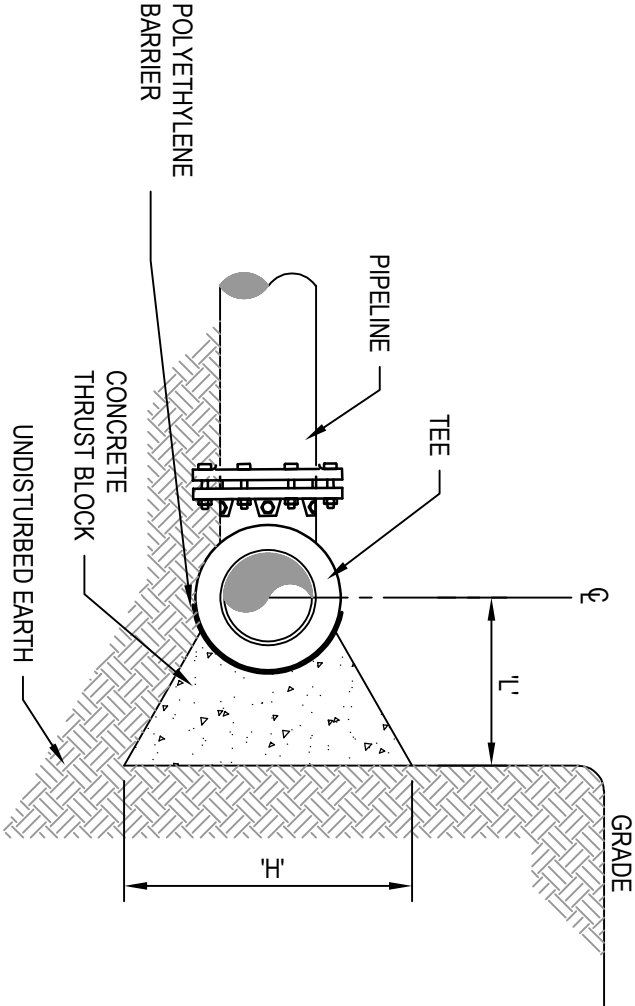
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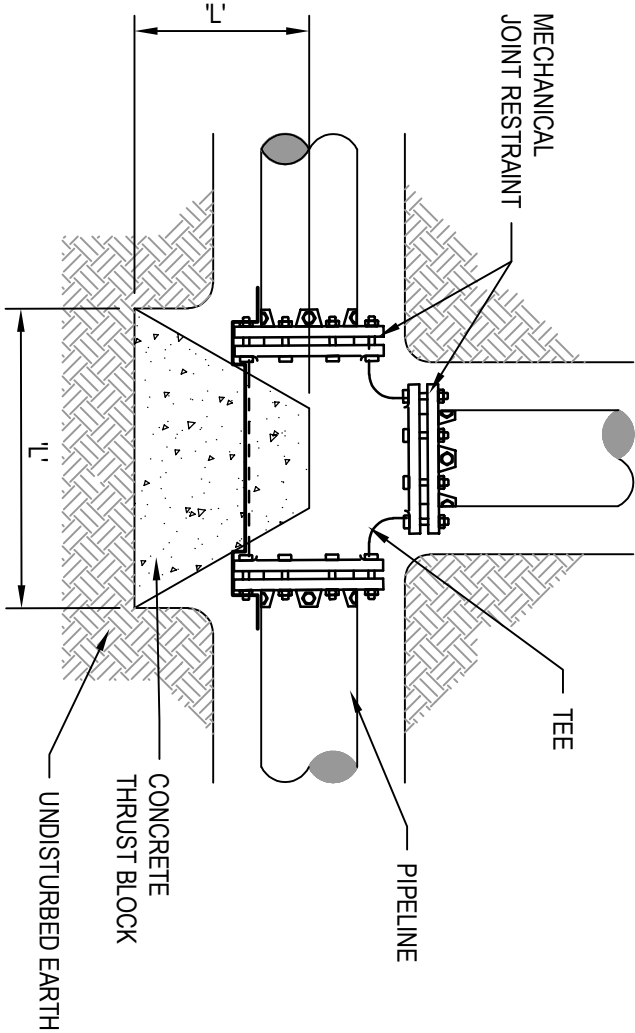


TAPPING SLEEVE AND VALVE DETAIL

W-09



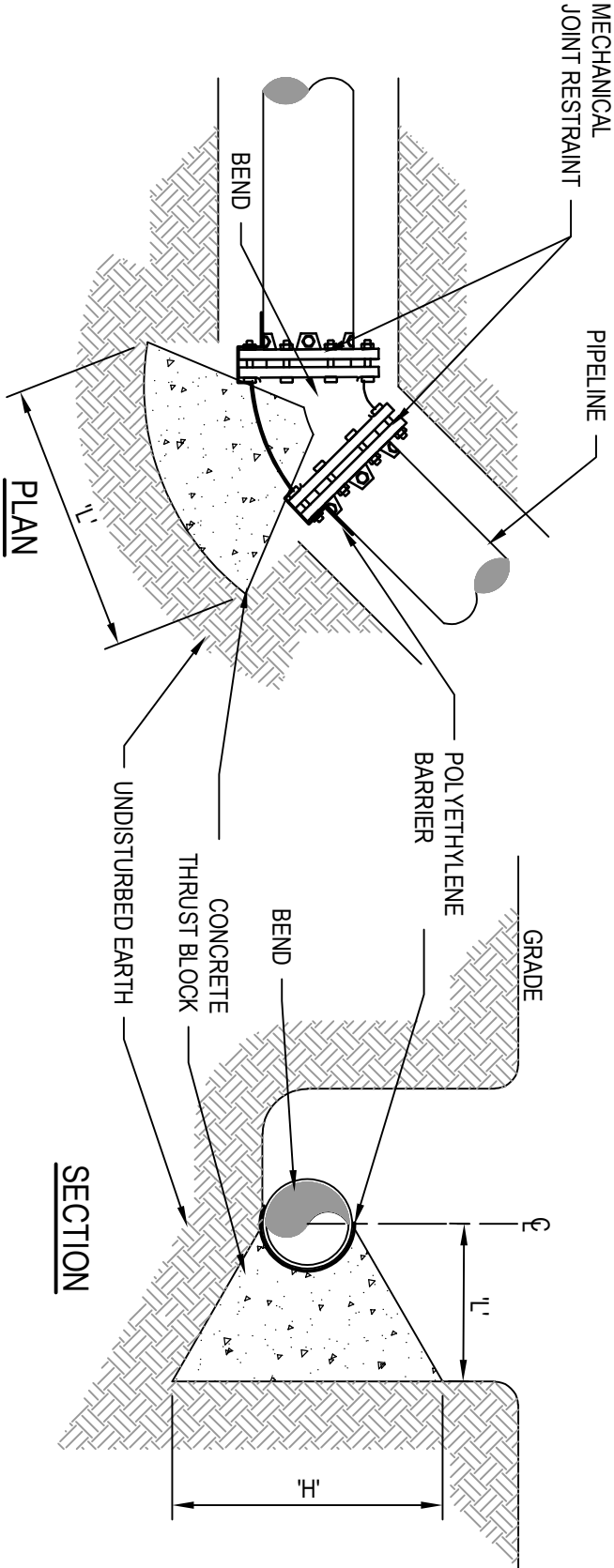
SECTION



PLAN

HORIZONTAL THRUST BLOCK FOR TEES

NTS



SECTION

PLAN

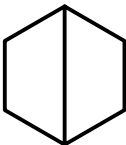
HORIZONTAL THRUST BLOCK FOR BENDS

NTS

HORIZONTAL ANCHOR DIMENSIONS FOR AVERAGE SOIL CONDITIONS											
UP TO 150 P.S.I. WORKING PRESSURE											
PIPE SIZE	PLUG, CAP, TEE OR TAP SLEEVE		90° BEND		45° BEND		22 1/2° BEND		11 1/4° BEND		
	H	L	H	L	H	L	H	L	H	L	
6"	1'-0"	2'-0"	1'-0"	2'-0"	1'-0"	1'-4"	0'-9"	1'-0"	0'-6"	1'-0"	
8"	1'-4"	2'-8"	1'-4"	2'-8"	1'-4"	1'-6"	1'-0"	1'-0"	0'-9"	1'-0"	
12"	2'-0"	4'-0"	2'-0"	4'-0"	2'-0"	2'-2"	1'-6"	1'-6"	1'-3"	1'-3"	
14"	2'-4"	4'-8"	2'-4"	4'-8"	2'-4"	2'-6"	1'-9"	1'-9"	1'-4"	1'-4"	
16"	2'-8"	5'-4"	2'-8"	5'-4"	2'-8"	3'-0"	2'-0"	2'-0"	1'-6"	1'-6"	

NOTES:

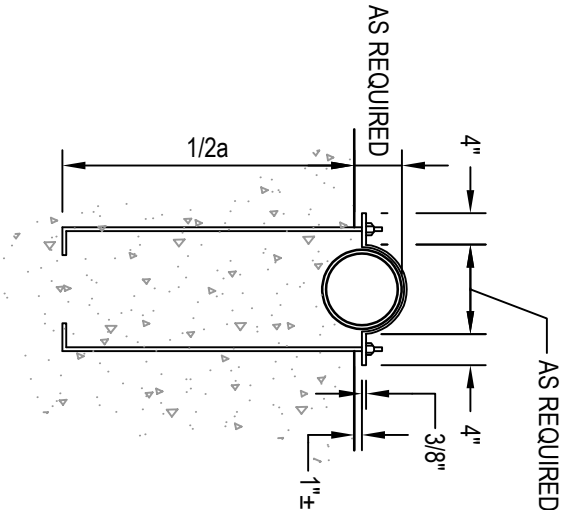
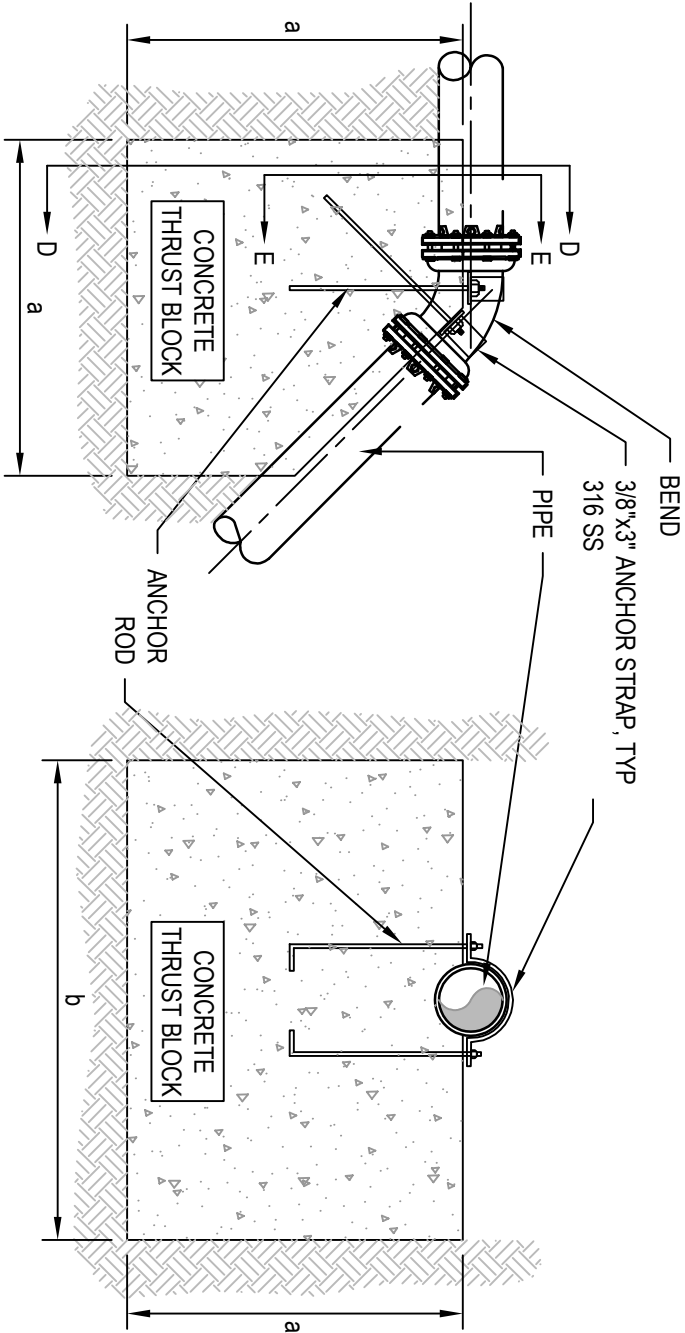
- SIZES BASED ON 150 PSI PRESSURE IN PIPELINE AND 2,000 PSF SOIL BEARING STRENGTH.
- ALL EXPOSED PORTIONS OF ANCHOR STRAPS TO RECEIVE A MINIMUM OF 2 FIELD COATS OF BITUMASTIC MATERIAL.
- PRIOR TO PLACING CONCRETE WRAP ANCHORS & ALL FITTINGS IN 8-MIL THICK POLYTHENE.
- ALL ANCHOR RODS SHALL BE TYPE 304 STAINLESS STEEL.



THRUST BLOCK - HORIZONTAL (TYP.)

NOT TO SCALE





ELEVATION

SECTION DD

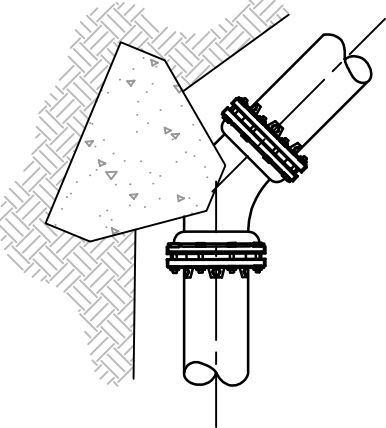
SECTION EE

VERTICAL ANCHOR DIMENSIONS

UP TO 150 P.S.I. WORKING PRESSURE									
PIPE SIZE	45° BEND			22 1/2° BEND			11 1/4° BEND		
	DIMENSION			DIMENSION			DIMENSION		
	a	b	c	Ø	a	b	c	Ø	Ø
6"	3'-0"	3'-0"	2'-0"	3/4"	2'-6"	2'-3"	1'-6"	3/4"	2'-6"
8"	3'-6"	3'-6"	2'-6"	3/4"	3'-0"	3'-0"	1'-9"	3/4"	2'-6"
12"	4'-9"	4'-6"	3'-3"	3/4"	4'-0"	3'-9"	2'-6"	3/4"	3'-3"
14"	5'-3"	5'-0"	3'-9"	3/4"	4'-3"	4'-3"	2'-6"	3/4"	3'-6"
16"	5'-9"	5'-6"	4'-0"	3/4"	4'-9"	4'-6"	2'-9"	3/4"	3'-9"

NOTES:

- SIZES BASED ON 150 PSI PRESSURE IN PIPELINE AND 2,000 PSF SOIL BEARING STRENGTH.
- ALL EXPOSED PORTIONS OF ANCHOR STRAPS TO RECEIVE A MINIMUM OF 2 FIELD COATS OF BITUMASTIC MATERIAL.
- PRIOR TO PLACING CONCRETE WRAP ANCHORS & ALL FITTINGS IN 8-MIL THICK POLYTHENE.
- ALL ANCHOR RODS SHALL BE TYPE 304 STAINLESS STEEL.

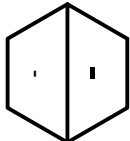


USE SAME DIMENSIONS AS FOR HORIZONTAL BEND ANCHORS

VERTICAL

THRUST BLOCK FOR BENDS

NOT TO SCALE



THRUST BLOCK - VERTICAL (TYP.)

SCALE : NONE

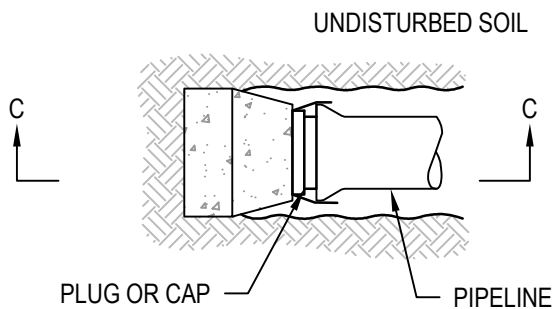
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SYRACUSE, NY 13210

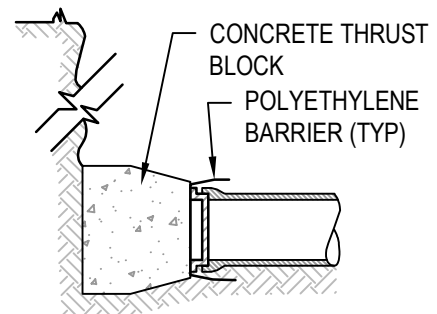


THRUST BLOCK VERTICAL DETAIL

W-11



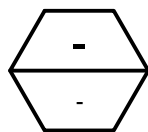
PLAN



SECTION C-C

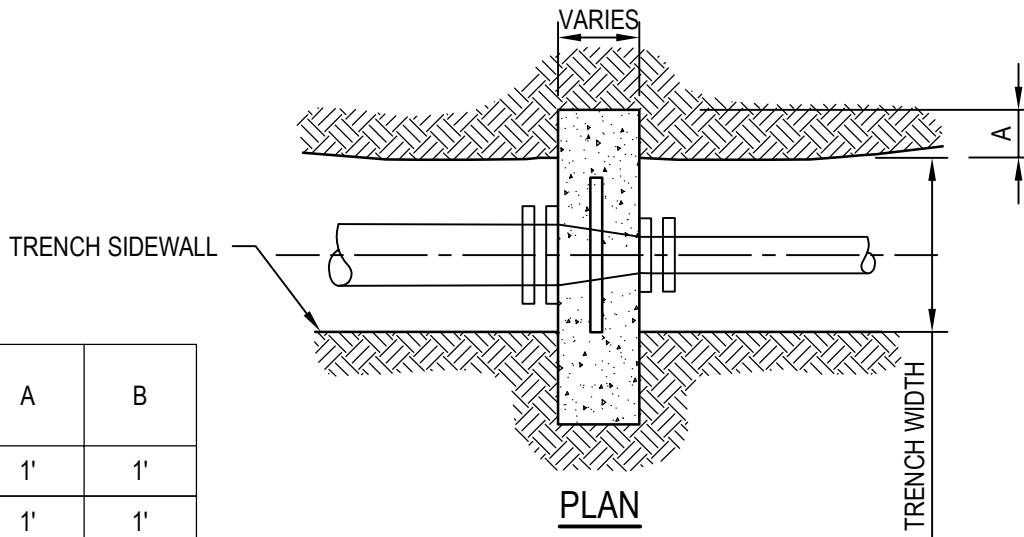
NOTES:

1. INSTALL POLYETHYLENE BARRIER PRIOR TO PLACING CONCRETE.
2. FOR DIMENSION SIZING, USE CHART FOR HORIZONTAL THRUST BLOCKS.



THRUST BLOCK - PLUG AND CAP

SCALE : NONE

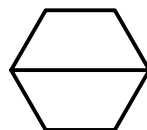
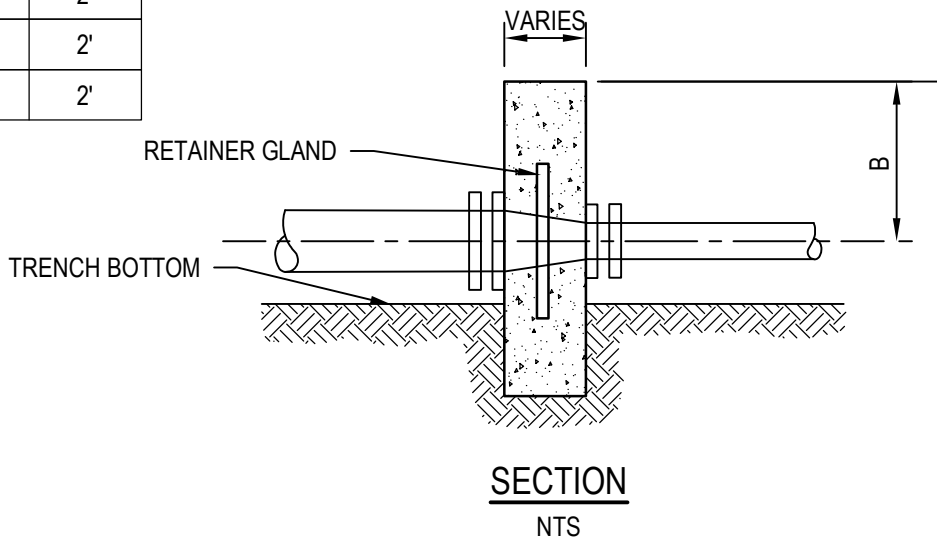


NTS

NOTES:

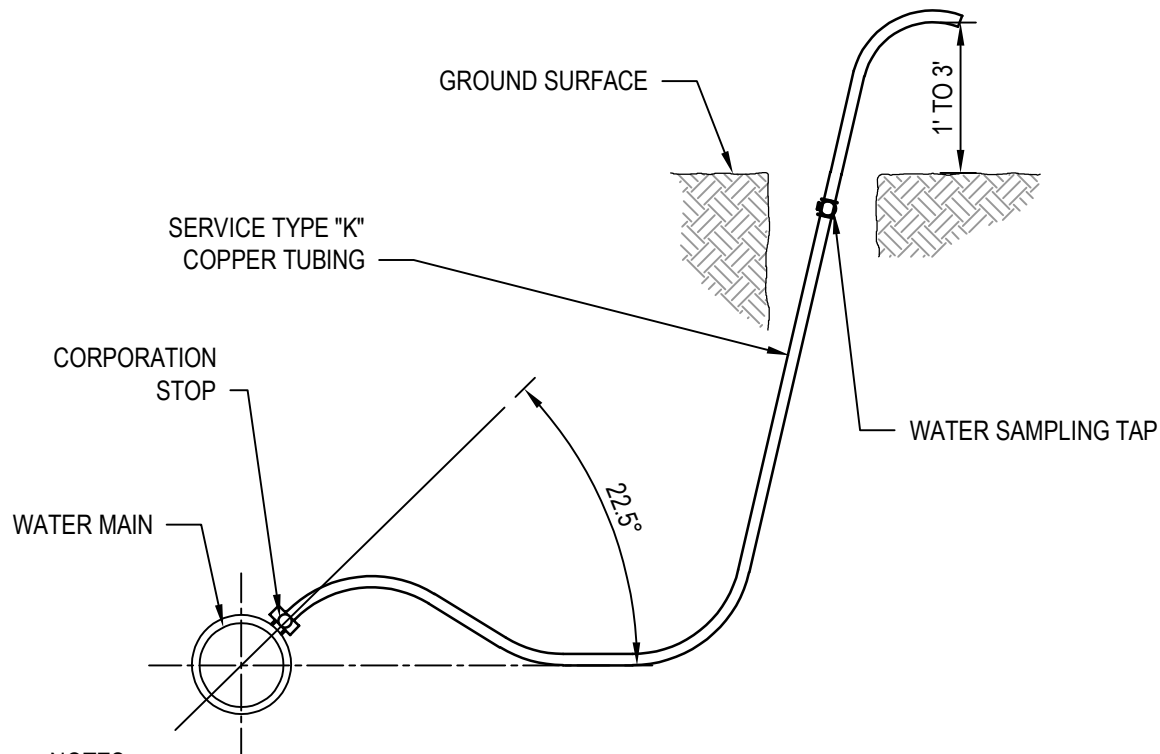
1. PIPING TO BE POLYETHYLENE WRAPPED PRIOR TO CONCRETE PLACEMENT.
2. USE HIGH EARLY CEMENT AND ALLOW CONCRETE TO ACHIEVE 90% STRENGTH BEFORE PLACING WATER- MAIN INTO SERVICE.

PIPE SIZE	A	B
6" x 4"	1'	1'
8" x 4"	1'	1'
8" x 6"	1'	1'
12" x 4"	2'	2'
12" x 6"	2'	2'
12" x 8"	2'	2'
16" x 6"	2'	2'
16" x 8"	2'	2'
16" x 12"	2'	2'



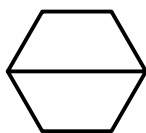
ANCHOR COLLAR FOR REDUCERS

NOT TO SCALE



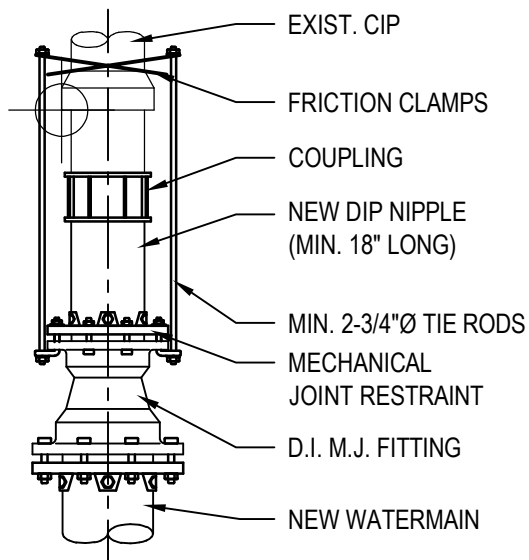
NOTES:

1. WHEN LOCATED IN PAVEMENT, TAP IS TO BE KEPT BELOW GROUND SURFACE EXCEPT WHEN IN USE. UPON NOTIFICATION OF ACCEPTABLE SAMPLE RESULTS, CORPORATION STOP IS TO BE CLOSED, AND TUBING DISCONNECTED AND REMOVED.
2. TAP MAY BE LOCATED AT THE SAME LOCATION OF A NEW WATER SERVICE. AFTER SAMPLE IS APPROVED, COPPER TUBING TO THE SURFACE IS TO BE REMOVED.
3. LOCATION OF TAP IS SUBJECT TO PRIOR APPROVAL OF THE OWNERS REPRESENTATIVE
4. ANY DISINFECTION / SAMPLING TAP NOT USED FOR A WATER SERVICE, MUST BE REMOVED FROM THE WATER MAIN, AND THE THREADED CORPORATION STOP TAP SHALL BE PLUGGED WITH A THREADED BRASS PLUG. AFTER PLUGGING MAIN, COAT BRASS PLUG WITH BITUMASTIC COATING.
5. ALL BRASS AND COPPER SHALL BE LEAD FREE.



WATER DISINFECTION/SAMPLING TAP

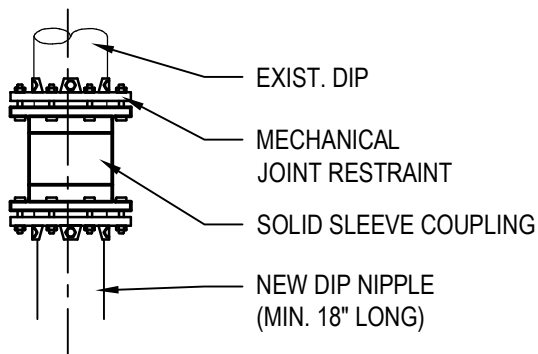
NOT TO SCALE



1. VALVES AND TEES MAY BE HARNESSSED SIMILARLY.
2. HARNESSING IS FOR RESISTANCE TO INTERNAL PRESSURE-PIPE ITSELF MUST BE SUPPORTED ON FIRM BEDDING AND CAREFULLY BACKFILLED.
3. COAT ALL EXPOSED SURFACES OF HARNESS ASSEMBLY WITH BITUMINOUS COATING.
4. TIE RODS SHALL BE PLACED ON SIDES OF PIPE.

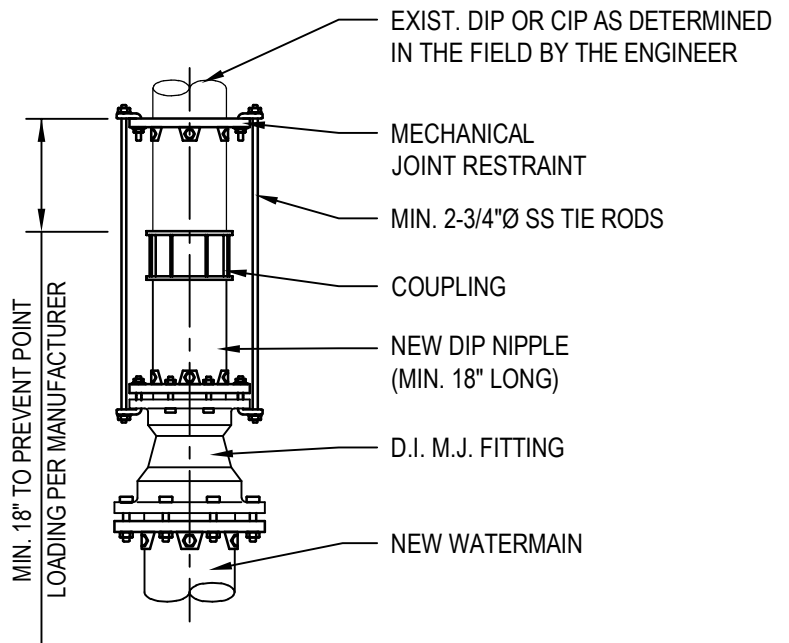
CONNECTION TO CIP

NTS



CONNECTION TO DIP

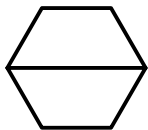
NTS



CONNECTION TO DIP OR CIP

NTS

CONNECTION TO EXISTING WATERMAIN THROUGH 12-INCH DIAMETER (TYP.)



NOT TO SCALE

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DEPARTMENT OF WATER

101 N. BEECH ST. SYRACUSE, NY 13210



CONNECTION TO EXISTING
WATER MAIN DETAIL

W-15

SECTION 01200

SUBMITTALS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Submittal procedures.
- B. Review of submittals.
- C. Schedule of Submittals.
- D. Shop Drawings.
- E. Samples.
- F. Manufacturer's instructions.

1.02. SUBMITTAL PROCEDURES

- A. Transmit each required submittal using Owner furnished form.
- B. Number the submittals as follows:
 - 1. First: Specification section number.
 - 2. Submittal number within the Specification section.
 - 3. Review cycle number.
 - 4. Title of submittal.
 - 5. For example:
 - a. 02510-01-01 – Field lock gaskets for DIP (first review cycle)
 - b. 02510-01-02 - Field lock gaskets for DIP (second review cycle)
 - c. 02510-02-01 – Flange pipe and fittings (first review cycle)
 - d. 02510-02-02 – Flange pipe and fittings (second review cycle)
 - e. 02510-02-03 – Flange pipe and fittings (third review cycle)
- C. Identify Project, Contractor, Subcontractor, and Supplier; pertinent Drawing number and detail number(s), and Specification sections, as appropriate.
- D. Apply stamp, signed or initialed providing certification that includes, at a minimum:
 - 1. Submittal Number _____
 - 2. Deviations: None _____; As Listed _____

3. Reference Specification Section _____
4. Reference Drawing Number _____
5. Space Requirement: As Designed _____ Different, As Listed _____
6. Representation is made to Owner and Engineer that Contractor has satisfied the requirements of General Conditions Article 6.17.C.1.a through d, [associated Supplementary Conditions], and that the Contractor hereby approves this submittal.
Contractor _____
Signature _____
Date _____
Date _____

- E. Schedule submittals to expedite the Project, and deliver to parties in the quantities and at the locations specified herein].
- F. Identify any and all deviations from Contract Documents.
- G. Identify product and/or system limitations which may be detrimental to successful performance of the completed Work.
- H. Identify space requirements which differ from those designed and/or shown on the Contract Documents.
- I. Provide space for Contractor and Owner review stamps.
- J. Revise and resubmit: Identify all changes made since previous submittal in a cover letter or memorandum.
- K. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.
- L. Submittals not required will not be recognized or processed.
- M. Items shall not be fabricated or delivered without fully approved Shop Drawings.
- N. Ensure no associated work begins until associated Shop Drawings are fully approved.
- O. Fabrication prior to receiving an "Approved" or "Approved as Corrected – No Resubmittal Required" is at Contractor's risk.

1.03. REVIEW OF SUBMITTALS

- A. Review times:
 1. No less than 15 days shall be allowed for Owner's review of submittals and resubmittals unless otherwise specified in the Contract Documents.
- B. Review Codes:
 1. Approved
 2. Approved as Corrected – No Resubmittal Required
 3. Approved as Corrected – Resubmit Written Responses and Requested Information

- 4. Revise and Resubmit
 - 5. Not Approved
 - 6. Informational Purposes Only
- C. Payment will not be made for any items requiring submittals until no further submittals are required for the item.

1.04. SCHEDULE OF SUBMITTALS

- A. Submit a PDF copy of preliminary Schedule of Submittals.
- B. Revise and resubmit until acceptable to Owner.

1.05. SHOP DRAWINGS

- A. Provide information as required by individual Specification sections.
- B. Shop Drawing submittals shall include all descriptive data, performance characteristics, material specifications, spare parts list, drawings, piping diagrams, wiring schematics, and shall be complete and accurate to indicate item-by-item compliance with the Contract Documents.
- C. Shop Drawings shall be drawn at scales matching those on the Drawings depicting the same items.
- D. All catalog cuts, manufacturer's specifications, drawings, and verbal descriptions shall be clearly marked to allow identification of the specific products used.
- E. If the submittal deviates from the requirements of the Specifications in any way, it shall be clearly marked in the submittal with the justifying reason stated for evaluation by Engineer.

1.06. SAMPLES

- A. Provide Samples of submitted materials as required by individual Specification sections.
- B. Submit Samples to illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate Sample submittals for interfacing work.
- C. Submit Samples of finishes from the full range of manufacturers' standard colors, textures, and patterns for Owner's selection.
- D. Include identification on each Sample, with full Project information.
- E. Submit the number or samples specified in individual Specification sections; one of which will be retained by Owner.
- F. Reviewed samples which may be used in the Work are indicated in individual Specification sections.

1.07. MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual Specification sections, submit manufacturers' printed instructions for delivery, storage, assembly, installation, adjusting, and finishing, in quantities specified for Shop Drawings.
- B. Identify conflicts between manufacturers' instructions and Contract Documents.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 02260

PROTECTION OF EXISTING FACILITIES

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Location of facilities.
- B. Notification of owners and authorities.
- C. Coordination and preparation.
- D. Protection of facilities.
- E. Relocation of facilities.
- F. Protection of sewers and storm drains.
- G. Protection of water mains near sewers.
- H. Abandonment of utilities.
- I. Restoration of property markers.

1.02. RELATED SECTIONS

- A. Section 01200 - SUBMITTALS
- B. Section 02220 - DEMOLITION
- C. Section 02222 - PAVEMENT CUTTING AND REMOVAL
- B. Section 02315 - EXCAVATION
- C. Section 02317 - TRENCHING

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01. LOCATION OF FACILITIES

- A. Prior to construction, verify location of existing underground facilities near or adjacent to project.
 - 1. Consult with appropriate Underground Facilities Protection Organization (Dig Safely New York) and owners of facilities and arrange for field stake-out or other markings to show locations.

2. Perform exploratory excavation at key junctures and other critical points to aid in ascertaining locations.
- B. Report field stake-out findings and results of exploratory excavations to Owner if possible changes in project location or design are indicated because of suspected interferences with existing facilities. Allow Owner sufficient time to determine magnitude of changes and to formulate instructions in that regard.
- C. If location of an existing underground facility is uncertain, apply careful excavation and probing techniques during construction to locate and avoid damage to same.

3.02. NOTIFICATIONS OF OWNERS AND AUTHORITIES

- A. Prior to construction, notify owners of existing facilities, including local Police and Fire Departments, of general scope, nature and planned progress schedule of the work.
- B. Notify owners of nearby underground facilities when excavating is to take place in a particular area, allowing them reasonable time to institute precautionary procedures or preventive measures which they deem necessary for protection of their facilities.
- C. When existing utilities, such as sewer, water, gas, telephone or electric power are damaged or disturbed during construction, immediately notify affected owner and Project Owner.
- D. Notify Police and Fire Departments, including affected owners, immediately if hazardous conditions are created or have the potential for occurring, as a result of damage to an existing facility or as a result of other activities at project site. Hazardous conditions could be created from: fire, explosion, escape of gas, escape of fuel oil, gasoline or industrial fluids, downed electrical wires, and disrupted underground electrical cables.

3.03. COORDINATION AND PREPARATION

- A. Discuss anticipated work schedule with local authorities and owners of utilities at preconstruction meeting, including procedures to be followed if one or more utilities are damaged or disrupted. Develop contingency plans to address Contractor's role in repair of damaged utilities.
- B. Make preparations beforehand to repair and restore damaged utilities, including arrangements for standby materials and equipment to be promptly assembled at site and utilized immediately.
- C. Adjust work schedules and personnel assignments as necessary to conform to requirements of utility owner whose utility is to be temporarily interrupted during construction. Cooperate with utility owner in this regard to minimize the time of interruption.
- D. Make preparations for and conform to applicable requirements of New York State Industrial Code Rule 53 (as amended April 1, 1975) entitled, "Construction, Excavation and Demolition Operations at or Near Underground Facilities," issued by State Department of Labor.

3.04. PROTECTION OF FACILITIES

- A. Plan and conduct construction operations so that operation of existing facilities near or adjacent to the Work, including electric, telephone, sewer, water, gas or drainage utilities, are sustained insofar as the requirements of the project will permit.
- B. Protect existing facilities from damage or movement through installation of adequate support systems and use of proper equipment, including application of careful excavation and backfilling techniques in sensitive areas.
- C. Existing utilities and other facilities which are damaged by the Contractor's construction operations shall be promptly repaired by Contractor to the satisfaction of the affected owner or, if he so elects, that owner will perform the repairs with his own forces. Under either arrangement, such repair work shall be done at Contractor's expense.
- D. When aboveground visible facilities such as poles, wires, cables, fences, signs or structures constitute an unavoidable interference, notify Owner and consult with affected owner regarding temporary removal and later restoration of the interfering item. Arrange with that owner to remove and later restore the interfering item to the satisfaction of the owner, subject to approval of the project Owner; or, allow affected owner to perform such work with his own forces. Under either arrangement, such work shall be done at Contractor's expense.
- E. Take all necessary precautions to prevent fires at or adjacent to the work, buildings, and other facilities. No burning of trash or debris is permitted. If permanent fire extinguishers are used, they shall be recharged and in "new" condition when turned over to Owner.

3.05. RELOCATION OF FACILITIES

- A. If the location or position of an existing gas or water pipe, public or private sewer or drain, conduit or structure be such as, in the opinion of Owner, to require its removal, realignment or change, such alteration shall be without cost to the Contractor for the work of removal, realignment, or change only.
- B. Uncovering, supporting and sustaining such facility before its removal or before and after its realignment or change, shall be the Contractor's responsibility as part of the work of his Contract.
- C. Contractor shall be entitled to extension of time for completion of entire work as the Owner determines that the entire work was delayed by the removal, realignment or change of such obstruction.

3.06. PROTECTION OF SEWERS AND STORM DRAINS

- A. Where existing sanitary sewers or storm drain systems are being replaced or interrupted provide temporary bypass pumping or piping to maintain flow around that segment of the Work such that no back-ups occur in existing systems.
- B. Existing sanitary sewer laterals damaged in the work or temporarily disconnected shall be restored to operation by the end of each work day. Existing sanitary sewer laterals crossing over new pipelines to be restored in accordance with details shown on the Drawings.

- C. Maintain existing manholes, catch basins, and other utility structures in their pre-work condition. Any material or debris entering same due to the Contractor's operation shall be promptly removed.

3.07. PROTECTION OF WATER MAINS NEAR SEWERS

- A. Where a minimum 10-foot horizontal separation or minimum 18-inch vertical separation (bottom of water pipe to top of sewer pipe) cannot be maintained between a water main and sewer line, one or more of the following remedies shall be incorporated in the work:
 - 1. The sewer lines shall be encased in 4,000 psi mix concrete for a length of 10 feet on either side of the water main.
 - 2. Both the water main and sewer line shall be constructed of pressure type joints of ductile iron pipe, and shall be pressure tested to 100 psi to assure water tightness.
 - 3. One full length of water main shall be centered over the sewer line, so that both joints will be as far from the sewer as possible.
 - 4. Relocate water main to obtain 18-inches minimum vertical separation.

3.08. ABANDONMENT OF UTILITIES

- A. Remove existing utilities to be abandoned within limits of trench excavation, or impinging on trench limits.
- B. Open ends of abandoned utilities, or those scheduled for abandonment, shall be bulkheaded by brick masonry or 4,000 psi mix concrete; or by cast iron plugs or caps in small diameter water mains.
- C. Abandoned piping 36-inch diameter or larger shall be completely filled with sand or gravel or other approved material prior to bulkheading the open end(s) or removed.
- D. Abandoned manholes and water valve casings shall be backfilled to grade with approved trench backfill material.
- E. Frames, covers, grates, water valve casing, sections of water piping, hydrants (including standpipe and boot) valves and other items to be abandoned shall, if ordered by Owner, be salvaged for reuse and be delivered to Owner's property yard.

3.09. RESTORATION OF PROPERTY MARKERS

- A. Property corner markers, boundary monuments, etc., disturbed or moved by the Contractor's operation shall be restored, in conformance with the property deed description, by a licensed land surveyor. Restoration of the property corner markers or boundary monuments shall be certified by said surveyor on a map prepared by him which shows the work accomplished. One copy of the map shall be given to the property owner and one copy given to the project Owner.

END OF SECTION

SECTION 02315

EXCAVATION

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Excavation for paving, landscaping, and structures.

1.02. RELATED SECTIONS

- A. Section 01400 - QUALITY CONTROL: Inspection of bearing surfaces.
- B. Section 01500 - TEMPORARY FACILITIES: Barriers, water controls, erosion and sediment controls.
- C. Section 02240 – REMOVAL OF WATER
- D. Section 02250 – SHEETING AND BRACING
- E. Section 02260 - PROTECTION OF EXISTING FACILITIES
- F. Section 02316 – COMPACTION
- G. Section 02317 - TRENCHING: Excavation and backfilling for underground utilities and utility structures.
- H. Section 02318 - ROCK REMOVAL
- I. Section 02320 - BACKFILLING

1.03. FIELD MEASUREMENTS

- A. Verify that survey benchmark and intended elevations for the work are as indicated.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01. PREPARATION

- A. Identify required lines, levels, contours, and datum. Review subsurface report and other available site information.
- B. Identify known underground, aboveground, and aerial utilities. Stake and flag locations.

- C. Notify utility company to remove and relocate utilities.
- D. Protect above- and below-grade utilities which are to remain.
- E. Protect plant life, lawns, rock outcropping and other features remaining as a portion of final landscaping.
- F. Protect benchmarks, existing structures, fences, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.
- G. Excavations shall be in complete accordance with all details of applicable codes, rules, and regulations including all local, state, and federal regulations including the Occupational Safety and Health Administration (OSHA) Title 29 Code of Federal Regulations Part 1926, Subpart P - Excavations and Trenching Standards. Contractor shall designate a "Competent Person" 29 CFR 1926.32(f) who shall be responsible for inspections of excavations on a daily basis and document and maintain daily trenching and excavation logs per OSHA 29 CFR 1926.

3.02. CLASSIFICATION OF EXCAVATED MATERIAL

- A. Classifications of excavated materials are as follows:
 - 1. Unclassified Excavation - "Unclassified excavation" shall include all material excavated within the authorized lines and grades prescribed in the Drawings. Unclassified excavation shall include "rock excavation" as well as "common excavation" as defined herein.
 - 2. Common Excavation - "Common excavation" shall include all excavation except "rock excavation." All unconsolidated and non-indurated material, rippable rock, loose rock, soft mineral matter, weathered rock or saprolite, and soft or friable shale which is removable with normal earth excavation equipment shall be considered "common excavation." All boulders and detached pieces of solid rock or concrete or masonry less than 1 cubic yard in volume shall be classified as "common excavation."
 - 3. Rock Excavation - "Rock excavation" shall include all sound solid masses, layers and ledges of consolidated and indurated rock or mineral matter of such hardness, durability and/or texture that it is not rippable or cannot be excavated with normal earth excavation equipment. Should a conflict arise as to the classification of excavation as either "common" or "rock," the following test shall be used in the appropriate determination:
 - a. Where practicable, a late model tractor mounted hydraulic ripper equipped with a one digging point of standard manufacturer's design adequately sized for use with and propelled by a crawler-type tractor rated between 210 and 240 net fly-wheel horsepower, operating in low gear, shall be utilized. Should the suspect material not be effectively loosened or broken down by ripping in a single pass with the aforementioned ripper, the material shall be classified as "rock."
 - b. In situations where interbedded strata of "common excavation" material and "rock excavation" material are encountered in the same excavation, the individual classification of those materials shall be made on an average percentage basis of the occurrence of those materials as measured in stratigraphic sections and as approved by the Engineer.

- c. When rock is encountered in excavations, it shall be removed by jackhammering or any other method suitable and safe considering the proximity of existing utilities or facilities.
- B. For this project, all excavated material shall be classified as common excavation.

3.03. EXCAVATING

- A. Underpin adjacent structures which may be damaged by excavation work, including utilities and pipe chases.
- B. Excavate subsoil required to accommodate building foundations, paving, site structures, and construction operations.
- C. Machine-slope banks to angle which is safe for specific material in which excavation is made.
- D. Excavation cut not to interfere with normal 45-degree bearing splay of foundation. Undercutting of excavation faces will not be permitted.
- E. Grade top perimeter of excavation to prevent surface water from draining into excavation.
- F. Hand trim excavation to required undisturbed subgrade. Remove loose matter.
- G. Remove lumped subsoil, boulders, and rock under 1 cubic yard, measured by volume. Refill voids with Mix "C" concrete or compacted gravel/crushed stone.
- H. Notify Engineer of unexpected subsurface conditions, or of questionable soils encountered at required subgrade elevations, and discontinue work in area until notified to resume operations.
- I. Should the Contractor, through negligence or otherwise carry his excavation below the designated subgrade, Mix "C" concrete or such other materials as may be approved by the Engineer, shall be furnished and placed as backfill in sufficient quantities to reestablish the designated subgrade surface. Granular material used for backfilling shall be spread and compacted in conformance with the requirements of Section 02320, Backfilling, and to the percentage compaction outlined therein. The cost of this refilling operation, including any tests associated therewith, shall be borne by Contractor.
- J. Remove surplus excavated material from site.

3.04. DISPOSAL OF MATERIAL

- A. All excavated material except reusable topsoil or reusable fill shall be classified as surplus material and disposed of off-site unless Owner designates an on-site location.
- B. On-site disposal of surplus material will not be allowed. Reuse of excavated material as on-site fill shall conform with Section 02320, Backfilling.
- C. Make all arrangements for disposal sites, unless the Owner designates special locations. All expenses for disposal shall be borne by the Contractor. Bidders shall carefully investigate all aspects of surplus material disposing operations.
- D. Prior to depositing surplus material at any off-site location, obtain a written agreement between Contractor and the owner of the property on which the disposal of the material is proposed. The agreement shall state that the owner of the property gives permission for the

Contractor to enter and deposit material of a particular classification on the owner's property at no expense to the project Owner, and shall include any other conditions pertinent to the situation as agreed upon by each party. A copy of said agreement shall be furnished to the Owner.

3.05. FIELD QUALITY CONTROL

- A. Field inspection will be performed under provisions of Section 01400, Quality Control.
- B. Provide for visual inspection of bearing surfaces.

3.06. PROTECTION

- A. Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.
- B. Protect bottom of excavations and soil adjacent to and beneath foundation, from freezing.
- C. Exposed subgrade surfaces shall remain undisturbed, drained, and maintained as uniform, plane areas, shaped to receive the foundation components of the building or structure.

END OF SECTION

SECTION 02316

COMPACTION

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Compaction requirements and test methods.
- B. Compact all subgrades, foundations, embankments, trench backfills, filled and backfilled material as specified.

1.02. RELATED SECTIONS

- A. Section 01050 – PAYMENT ITEM DESCRIPTIONS
- B. Section 01400 – QUALITY CONTROL: Inspection and testing by laboratory services.
- C. Section 02315 - EXCAVATION
- D. Section 02317 - TRENCHING
- E. Section 02320 – BACKFILLING

1.03. REFERENCES

- A. ASTM D698 - Laboratory Compaction of Soil Using Standard Effort
- B. ASTM D1556 - Density of Soil in Place by the Sand-Cone Method
- C. ASTM D1557 - Laboratory Compaction of Soil Using Modified Effort
- D. ASTM D2922 - Density of Soil in Place by Nuclear Methods
- E. ASTM D3017 - Water Content of Soil in Place by Nuclear Methods

1.04. SUBMITTAL

- A. Submit in writing a description of the equipment and methods proposed to be used for compaction.

1.05. QUALITY ASSURANCE

- A. The Contractor shall adopt compaction methods which will produce the degree of compaction specified herein, prevent subsequent settlement, and provide adequate support for the surface treatment, pavement, structure and piping to be placed thereon, or therein, without damage to the new or existing facilities.
- B. The natural subgrade for all footing, mats, slabs-on-grade for structures or pipes shall consist of firm undisturbed natural soil, at the grades shown on the Drawings.
- C. After excavation to subgrade is completed, the subgrade shall be compacted if it consists of loose granular soil or if its surface is disturbed by the teeth of excavating equipment.

1. This compaction shall be limited to that required to compact loose surface material and shall be terminated in the event that it causes disturbance to underlying fine-grained soils, as revealed by weaving or deflection of the subgrade under the compaction equipment.
2. If the subgrade soils consist of saturated fine or silty sands, silts, or clay or varved clays, no compaction shall be applied.

PART 2 PRODUCTS

2.01. MATERIALS

- A. Materials to be compacted shall be as specified in Section 02315, Section 02317, and Section 02320.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Examine spaces to be filled beforehand and remove all unsuitable materials and debris including sheeting, forms, trash, stumps, plant life, etc.
- B. Inspect backfill and fill materials beforehand and remove all roots, vegetation, organic matter, or other foreign debris. Stones larger than 12 inches in any dimension shall also be removed or broken into smaller pieces.
- C. No backfill or fill material shall be placed on frozen ground nor shall the material itself be frozen or contain frozen soil fragments.
- D. Spaces to be filled shall be free from standing water so that placement and compaction of the fill materials can be accomplished in "dry" conditions.

3.02. PREPARATION

- A. Brace walls and slabs of structures to support surcharge loads and construction loads imposed by compaction operations.
- B. Each layer of fill shall be compacted to the specified density the same day it is placed.
 1. The moisture content of backfill or fill material shall be adjusted, if necessary to achieve the required degree of compaction.
- C. Compact each lift in accordance with Table 1.
- D. Match compaction equipment and methods to the material and location being compacted in order to obtain specified compaction, with consideration of the following guidelines:
 1. Rubber-tired rollers are preferred for most areas to prevent bridging of softer materials.

2. Double smooth drum rollers may be used provided that careful inspection can prevent bridging.
3. Compaction roller should be lighter in weight than proof-rolling equipment, with a minimum compaction force of 350 lbs per linear inch (PLI).
4. Vibratory compaction is preferred for dry, granular materials.
5. Hand compaction equipment such as impact rammers, plate or small drum vibrators, or pneumatic buttonhead compactors should be used in confined areas.
6. Hydraulic compaction by ponding or jetting will not be permitted except in unusual conditions, and then only upon written approval by the Owner and after a demonstration of effectiveness.
7. Backhoe-mounted hydraulic or vibratory tampers are preferred for compaction of backfill in trenches under pavements over 4 feet in depth. The upper 4 feet shall be compacted as detailed above or with hand-guided or self-propelled vibratory compactors or static roller.
8. For plastic pipelines (PVC, PE or PB) do not compact directly over center of pipe until backfill has reached 2 feet above top of pipe.

TABLE 1

COMPACTION REQUIREMENTS

CONSTRUCTION ELEMENT	MAXIMUM COMPACTION LAYER THICKNESS (INCHES)	ASTM	MINIMUM COMPACTION
I. STRUCTURES*			
a. Fill beneath foundation elements and under slabs-on-grade - hand-guided compaction	6	D1557	95%
Fill beneath foundation elements and under slabs-on-grade - self-propelled or tractor-drawn compaction	8	D1557	95%
b. Fill around structures and above footings	8	D1557	95%
II. TRENCHES**			
a. Fill under pipelines and pipe bedding	8	D1557	95%
b. Pipe sidefills and top 4 feet of pipe backfill under pavements	12	D1557	93%
c. Backfill below 4 feet under pavement	18	D1557	90%
d. Backfill under lawns, gardens and cultivated fields	24	D1557	90%
e. All other trenches***	36	D698	85%
III. EMBANKMENTS AND FILLS			
a. Fill under streets, parking lots, and other paved areas	12	D1557	92%
b. Embankments not supporting pavement or structures	18	D1557	90%
c. Rough site grading	24	D698	85%

* Where structural loads are carried by piles, caissons or other deep foundations, minimum compaction may be reduced to 92 percent.

** The first 1 foot above pipelines shall have a compacted thickness of 12 inches.

*** For cross-country pipelines, lifts may be compacted with a backhoe bucket or other means, and slightly mounded at the surface provided that regrading is performed within the guarantee period.

3.03. FIELD QUALITY CONTROL

A. Material Testing

1. The Owner reserves the right to order testing of materials at any time during the work.
2. Testing will be done by a qualified, independent testing laboratory in accordance with this section and Section 01400, Quality Control.
3. The Contractor shall aid the Owner in obtaining representative material samples to be used in testing.
4. For each material which does not meet specifications, the Contractor shall reimburse the Owner for the cost of the test and shall supply an equal quantity of acceptable material, at no additional compensation.
5. The Contractor shall anticipate these tests and incorporate the time and effort into procedure.

B. Compaction Testing

1. The Owner reserves the right to order the qualified independent testing laboratory to conduct in-place density tests of compacted lifts.
2. Testing shall be conducted for every 200 cubic yards of fill or backfill, or every 100 linear feet of trench backfill placed.
3. The Contractor shall dig test holes and provide access to all backfill areas at no additional compensation when requested by the Owner.
4. For each test which does not meet specifications, the Contractor shall retest at his cost. If the retest does not meet specifications, the Contractor shall replace and recompact material to the specifications at no additional cost to the Owner.
5. The Contractor shall anticipate these tests and incorporate the time and effort into procedures.
6. Nuclear moisture density testing by "probe" methods will be acceptable for compacted layers not exceeding 8 inches in thickness.
 - a. Nuclear "backscatter" methods will be acceptable only for testing asphalt paving layers not in excess of 3 inches in thickness.
 - b. Only certified personnel will conduct nuclear testing.
 - c. If the nuclear method is utilized, the results shall be checked by at least one in-place density test method described above.

C. Unacceptable Stockpiled Material - Stockpiled material may be tested according to material testing materials.

- D. Alternate Methods of Compaction - The Contractor may employ alternate methods of compaction if the desired degree of compaction can be successfully demonstrated to the Owner's satisfaction.
- E. Select Material - On-Site
 - 1. Any on-site material may be used for select fill material provided it meets all the requirements of the equivalent off-site material.
 - 2. No on-site material shall be used without prior approval of the Owner.
- F. Systematic Compaction - Compaction shall be done systematically, and no consideration shall be given to incidental coverage due to construction vehicle traffic.

3.04. PROTECTION

- A. Prior to terminating work for the day, the final layer of compacted fill, after compaction, shall be rolled with a smooth-wheel roller if necessary to eliminate ridges of soil left by tractors or equipment used for compaction or installing the material.
- B. As backfill progresses, the surface shall be graded so as to drain off during incidence of rain such that no ponding of water shall occur on the surface of the fill.
- C. The Contractor shall not place a layer of fill on snow, ice or soil that was permitted to freeze prior to compaction.
 - 1. These unsatisfactory materials shall be removed prior to fill placement.

END OF SECTION

SECTION 02317
TRENCHING

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Excavating trenches for utilities.
- B. Pipe foundations and bedding.
- C. Backfilling and compacting.
- D. Materials.

1.02. REFERENCES AND STANDARDS

- A. Standard Material Specifications for gravel, sand, crushed stone and gravel-cement mixtures published by the Department of Transportation (DOT) of the State in which project is located
- B. ASTM C136: Sieve Analysis of Fine and Course Aggregates
- C. ASTM D1556: Density of Soil in Place by Sand-Cone Method
- D. ASTM D1557: Laboratory Compaction of Soil Using Modified Effort
- E. ASTM D2922: Density of Soil in Place by Nuclear Methods
- F. ASTM D3017: Water Content of Soil in Place by Nuclear Methods
- G. OSHA: Occupational Safety and Health Administration

1.03. RELATED SECTIONS

- A. Section 01300 – CONSTRUCTION DOCUMENTATION
- B. Section 01400 – QUALITY CONTROL
- C. Section 01500 – TEMPORARY FACILITIES
- D. Section 01600 – RECORD DOCUMENTS
- E. Section 02220 - DEMOLITION
- F. Section 02222 – PAVEMENT CUTTING AND REMOVAL
- G. Section 02240 – REMOVAL OF WATER
- H. Section 02250 – SHEETING AND BRACING
- I. Section 02260 – PROTECTION OF EXISTING FACILITIES
- J. Section 02316 - COMPACTION
- K. Section 02318 – ROCK REMOVAL
- L. Section 02510 – WATER DISTRIBUTION PIPING AND APPURTENANCES
- M. Section 02535 – SANITARY SEWAGE PIPING AND ACCESSORIES
- N. Section 03001 – CONCRETE

1.04. SUBMITTALS

- A. Submit under provisions of Section 01200.

B. Granular Materials

1. Granular materials required for filling, backfilling, bedding, subbase and other purposes shall be as shown on the Drawings or ordered by Owner. Prior to bidding, prospective contractors shall familiarize themselves with the available quantities of approved on-site and off-site materials.
2. For each on-site or off-site material proposed, furnish to Owner for approval a certified gradation analysis at least ten (10) days prior to date of anticipated use of such material. Except as specified herein, only off-site approved materials shall be utilized.
3. The Owner reserves the right to inspect proposed sources of off-site granular material and to order such tests of the materials as he deems necessary to ascertain its quality and gradation of particle size. The Contractor shall, at his own expense, engage an approved testing laboratory to perform such test, and submit certified test results to the Owner. If similar tests of the material from a particular source were performed previously, submit results of these tests to the Owner for consideration.
4. No granular materials shall be used on this project for fill, backfill, bedding, subbase, or other purpose until approval is obtained from the Owner, and only material from approved sources shall be used.

C. Geotextile Fabric

1. Submit a 1 square foot sample of each geotextile to be used.
2. Submit manufacturer's specifications of average roll characteristics for standards ASTM geotextile tests for each geotextile to be used.

PART 2 PRODUCTS

2.01. ON-SITE MATERIALS

- A. Type A, Excavated Material - Material under this classification shall be derived solely from excavations necessary to construct the project to the lines and grades specified. If the excavated material on-site is approved for reuse and is suitable, it shall be used for filling or backfilling purposes. If he so elects, the Contractor may, at his own expense, substitute other types of material in place of Type A Material, provided such substitution is approved in advance by the Owner. All replaced or surplus material shall be disposed of as outlined in Section 02220.

1. Unclassified Excavated Material
 - a. Type A-1 - Referred to as "excavated material" and from which all frozen material, boulders, trash and foreign debris greater than 6 inches in any dimension has been removed. Approved Type A-1 material shall be used for all backfilling except under structures.
 - b. Type A-2 - Referred to as "select excavated material" and from which all frozen material, humus, peat, roots, vegetation, ashes, trash, debris, and rocks or stones greater than 2 inches in any dimension have been removed.
2. Classified Excavated Material - Where the Contract Documents allow the reuse of excavated on-site materials as a substitute for off-site sources of Type "B" gravel or Type "C" sands, the minimum requirements for each of those excavated materials shall be the same as required for the equivalent off-site material. If such materials are used, submit for approval in writing the proposed methods of excavation, location of stockpiles, quantities of required sand and gravels, estimated excavation quantities and proposed excavation limits within the accepted excavation area. Provide a demonstration at least 10 days prior to commencement of excavation that the methods will provide consistent quantity and quality of material as specified for Type "B" gravels and Type "C" sands. The Owner will require subsurface investigations, sampling, and testing to confirm the

extent and quality of the proposed material. Cost of all investigations, sampling, and testing shall be the Contractor's responsibility.

B. Type E - Borrow Material

1. "Borrow material" is defined as approved on-site material required for fill or backfill in excess of the quantity of available approved material designated as Type "A" material.
2. No such borrow material shall be used on this project unless specified in the Contract Documents and except within the limits of borrow areas designated on the Drawings.
3. Approval of all borrow material must be obtained from the Owner, and only material from approved sources shall be used.
4. Use of designated borrow areas shall be subject to the approval of the Owner at all times. Test pits and analyses of borrow material shall be provided as required by the Owner for each borrow area and at the expense of the Contractor. In addition, the Owner may require full excavation and restoration plans for each borrow area. All borrow areas shall be stripped of topsoil and organic materials far enough in advance of operations that contamination of borrow material is prevented.

a. Unclassified Borrow Material

- i. This material consists of a naturally occurring mixture of sand, silts, clay, gravel, deteriorated rock or other inorganic particles.
- ii. Type E-1 - Referred to as "common borrow material", from which all frozen material, boulders, trash or debris have been removed.
- iii. Type E-2 - Referred to as "select borrow material" and from which all frozen material, humus, peat, roots, vegetation, ashes, trash, debris, and rocks or stones greater than 6 inches in any dimension have been removed.

- b. Classified Borrow Material - Where the Contract Documents allow the use of on-site borrow areas as a substitute for off-site sources of Type "B" gravels and Type "C" sands, the requirements for each of those on-site materials shall be the same as off-site sources. In addition, all of the requirements for "classified excavated material" (Type "E" material) must be met at least 10 days prior to the acceptance of approved borrow areas for use as a source of Type "B" gravel or Type "C" sand.

2.02. OFF-SITE MATERIAL

Within the following specifications where grain size distribution requires a maximum of 10 percent or less material capable of passing the #200 mesh sieve, the percentage of material finer (than the #200 sieve) by weight shall be determined by wet screening in accordance with ASTM Standard D-1140. It is the intent of the specifications to allow the use of granular materials from local suppliers. Material Specifications shall conform to the requirements of the New York State Department of Transportation, (NYSDOT) and shall conform to the latest NYSDOT Standard Specification.

No gravel, sand, crushed stone or run-of-crusher material shall be used for this project until acceptance is obtained from the Owner, and only material from approved sources shall be used. A certified sieve analysis from the supplier shall be submitted for the Owner's acceptance prior to the use of any materials specified in this section.

A. Bedding and Pipe Encasement

1. NYSDOT No. 1 Crushed Stone or Crushed Gravel – bedding for DIP, water main. Thoroughly washed, clean, sound, tough, hard, crushed limestone conforming to the requirements of NYSDOT Item No. 703.0201 or crushed gravel conforming to the requirements of NYSDOT Item No. 703.0202, having the following gradation by weight:

% Passing	Sieve
100	1-inch
90-100	1/2-inch
0-15	1/4-inch

2. NYSDOT No. 2A Crushed Stone or Crushed Gravel – bedding for DIP water main. Shall be a No. 1 and No. 2 blend, thoroughly washed, clean, sound, tough, hard, crushed limestone conforming to the requirements of NYSDOT Item No. 703.0201 or crushed gravel conforming to the requirements of NYSDOT Item No. 703.0202, having the following gradation by weight:

% Passing	Sieve
100	1-1/2-inch
93-100	1-inch
27-58	1/2-inch
0-8	1/4-inch

3. NYSDOT Concrete Sand – bedding for copper tubing. Washed, fine aggregate sand shall conform to the requirements of NYSDOT Item No. 703.07, having the following gradation by weight:

% Passing	Sieve
100	3/8-inch
90 - 100	No. 4
75 - 100	No. 8
50 - 85	No. 16
25 - 60	No. 30
10 - 30	No. 50
1 - 10	No. 100
0 - 3	No. 200

- B. Select Backfill - NYSDOT Subbase Type 2 Crusher Run Stone or Crusher Run Gravel. Material shall conform to the requirements of NYSDOT Item No. 304.12, having the following gradation by weight:

% Passing	Sieve
100	2-inch
25 - 60	1/4-inch
5 - 40	No. 40
0 - 10	No. 200

- C. Recycled concrete or asphalt pavement shall not be allowed.
D. Slag of any type shall not be allowed.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Submit for approval fill materials to be reused.

3.02. PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Prior to start of construction, notify all impacted organizations, and have staked or marked all underground utilities. Utilities include water, gas, electrical, telephone, cable, storm sewer, sanitary sewers, laterals, and services. In the event such locations indicate a possible interference, or when needed to locate points of connection to existing facilities, perform exploratory excavations to determine the utilities' location and elevation. Provide the Owner with the results of the exploratory excavations for his review. Allow the Owner sufficient time to determine any changes required as a result of such exploratory excavations prior to start of construction.
- C. When the project consists of reconstructing sanitary sewers and reconnection of existing sanitary laterals, only reconnect live laterals, unless otherwise shown on the Drawings. Verify whether the lateral is alive or abandoned and the source of the lateral using such methods as necessary including dyeing, flushing with water, roding, pipe locators, and exploratory excavations.
- D. Abandoned pipes and laterals shall be plugged in with 12 inches of concrete or grout or for large pipes with solid brick masonry.
- E. Conduct the operations such that no interruptions to the existing utility system shall occur. Where existing sanitary sewers or storm drain systems are being replaced or interrupted, provide temporary bypass pumping or temporary piping to maintain flow around the work site such that no backups occur in these sewer systems.
- F. Existing sanitary sewer laterals damaged in the work or temporarily disconnected shall be restored to operation by the end of each work day. Existing sanitary sewer laterals where crossing over new pipelines to be restored in accordance with details shown on the drawings.
- G. Maintain existing manholes, catch basins, and other utility structures above and below grade which are to remain in their pre-work condition. Any material or debris entering same due to the operation shall be promptly removed.
- H. Protect plant life, lawns, rock outcropping and other features remaining as a portion of final landscaping.
- I. Protect control points, bench marks, existing structures, fences, sidewalks, paving, and curbs from excavation equipment and vehicular traffic. Preserve the control points provided by the Owner throughout the life of the project, and accurately replace any such point, which is damaged or moved, at Contractor's expense.
- J. Cut out soft areas of subgrade not capable of insitu compaction. Backfill with Type III pipe foundation and compact to density equal to or greater than requirements for subsequent backfill material.
- K. Brace walls and slabs of structures to support surcharge loads and construction loads imposed by backfilling operations.
- L. Maintain a stable, dry backfill area in accordance with Section 02320.
- M. Remove all water, snow, ice and debris from surfaces to accept fill materials and from the backfill material. No calcium chloride or other chemicals shall be used to prevent freezing.

- N. Areas to receive compacted fill shall be graded to prevent surface runoff and ponding in accordance with Section 02370.
- O. No fill or backfill material may be used without approval of the Owner.
- P. No geotextile fabric may be used without approval of the Owner.
- Q. Backfill operations shall be started at the lowest elevation in the area to be backfilled, and continue, in horizontal layers, upward to the limits specified.
- R. Backfill material shall be within 2 percent of the optimum moisture content for that material.
- S. Any crushed gravel stockpiles which have undergone excessive particle segregation shall be reviewed and approved by the Owner prior to placement.

3.03. TRENCH EXCAVATION

- A. Trenches for underground piping, ductwork, drains, and similar utilities shall be excavated and maintained as shown on the Drawings and specified in this Section. Trench widths shall be held within the minimum and maximum limits shown on the Drawings. If a prefabricated, mobile shield is utilized in lieu of conventional sheeting and bracing in pipe trenches, the bottom of the shield shall be maintained as high as possible (preferably above the spring line of the pipe) so as to prevent disturbance of the pipe foundation material and to avoid forces which would tend to pull pipe joints apart when the shield is dragged forward. Gouged openings or troughs left by the shield shall be filled with additional pipe foundation material and thoroughly compacted. Installation of sheeting and bracing and use of mobile shields shall be in complete accordance with all details of applicable safety codes, rules and regulations including all applicable local, State, Federal, and OSHA regulations.
- B. Excavation shall be such that a flat bottom trench of allowable width is established at the required subgrade elevation for subsequent installation of pipe foundation material.
- C. If indicated on the Drawings or when required as a result of unsuitable soil conditions, trench excavation shall be carried below the required subgrade and a special pipe foundation installed in conformance with the Contract Documents. In any event, operations shall result in stable trench walls and a stable base free from standing water, consistent with trench width requirements.
- D. Bedrock, boulders and cobbles greater than 6 inches shall be trimmed back or removed on each side of the trench so that no rock protrudes within 6 inches of the installed pipe. Rock shall also be trimmed back across the bottom of the trench so that no rock, boulder or cobble protrudes within 4 inches of the installed pipe.
- E. In general, trenches shall not be opened for more than 50 feet in advance of installed pipe. Excavation of the trench shall be fully completed at least 5 feet in advance of pipe laying operations. No more than 40 feet of trench shall be left open overnight.

3.04. EXCAVATION CLASSIFICATION

All material excavated will be measured and classified as provided herein.

Unclassified Excavation - "Unclassified excavation" shall include all materials excavated within the authorized lines and grades prescribed in the Drawings. Unclassified excavation shall include "rock excavation" as well as "common excavation" as defined herein. Unless specifically designated otherwise in the appropriate bid items of the Bid Proposal, all excavation shall be considered to be "unclassified excavation."

Common Excavation - "Common excavation" shall include all excavation except "rock excavation." All unconsolidated and non-indurated material, rippable rock, loose rock, soft mineral matter, weathered rock or saprolite, and soft or friable shale which is removable with normal earth excavation equipment shall be considered "common excavation." All boulders and detached pieces of solid rock or concrete or masonry less than 1 cubic yard in volume shall be classified as "common excavation."

Rock Excavation - "Rock excavation" shall include all sound solid masses, layers and ledges of consolidated and indurated rock or mineral matter of such hardness, durability and/or texture that it is not rippable or cannot be excavated with normal earth excavation equipment. Should a conflict arise as to the classification of excavation as either "common" or "rock," the following tests shall be used in the appropriate determination:

Where practicable, a late model tractor mounted hydraulic ripper equipped with a one digging point of standard manufacturer's design adequately sized for use with and propelled by a crawler-type tractor rated between 210 and 240 net fly-wheel horsepower, operating in low gear, shall be utilized. Should the suspect material not be effectively loosened or broken down by ripping in a single pass with the aforementioned ripper, the material shall be classified as "rock."

In situations where inter-bedded strata of "common excavation" material and "rock excavation" material are encountered in the same excavation, the individual classification of those materials shall be made on an average percentage basis of the occurrence of those materials as measured in stratigraphic sections and as approved by the Owner.

When rock is encountered in excavations, it shall be removed by jack hammering or any other method suitable and safe considering the proximity of existing utilities or facilities.

Extra compensation for excavation of rock by special means will be allowed only if specifically authorized in appropriate bid items of the Bid Proposal.

3.05. UNAUTHORIZED EXCAVATION

The Contractor shall not be entitled to additional compensation for unauthorized excavations carried beyond or below the lines and subgrades prescribed in the Contract Documents. The Contractor shall refill such unauthorized excavations at his own expense, and in conformance with the following provisions of this Article.

Should the Contractor, through negligence or for reasons of his own, carry his excavation below the designated subgrade, fill concrete or such other material as may be approved by the Owner, as specified in PART 2, shall be furnished and placed as backfill in sufficient quantities to reestablish the designated subgrade surface. Granular material used for backfilling shall be spread and compacted in conformance with the requirements of later Articles of the section, and to the percentage compaction outline therein. The cost of any tests associated with this refilling operation shall be borne by the Contractor.

If the maximum widths of pipe trenches are exceeded, the installed pipes shall be fully cradled in a minimum of 6 inches of fill concrete, as specified elsewhere, and at the Contractor's expense. Excavation below subgrade which is ordered by the Owner because the normal subgrade has been disturbed by the Contractor's operations shall be considered as unauthorized excavation.

3.06. MAINTENANCE OF EXCAVATIONS

All excavations shall be properly and legally maintained while they are open and exposed. Sufficient and suitable barricades, warning lights, flood lights, signs, etc., to protect life and property shall be installed and maintained at all times until the excavation has been backfilled and graded to a safe and satisfactory condition. All signs, markers, barricades shall conform to the requirements of the manual of Uniform Traffic Control Devices. All barricades, signs and markers shall be reflectorized.

To maintain traffic and safety temporary plating over trenches consisting of steel plates shall be used to temporarily bridge trench excavations. Plates shall be of size and positioned to provide adequate bearing at plate edges, shall be securely anchored, and shall be fitted in place in a manner to minimize noise when crossed by traffic. Plates shall be of sufficient thickness to safely carry heavy traffic without detrimental deflection; however, unless otherwise specified, the minimum thickness of plates shall be 1-inch.

Plate edges exposed to traffic shall be feathered with asphalt mix as part of trench excavation work. Work includes surveillance and adjustment of plating over trenches which shall be provided by the Contractor during non-working hours, weekends, and holidays.

3.07. PIPE FOUNDATIONS

- A. All pipes, fittings or specials which are to be installed in the open trench excavation shall be properly bedded in, and uniformly supported on pipe foundations of the various types specified herein and shown on the Drawings. Flat-bottom trenches of required width shall be excavated to the necessary depth as required in the Table of Quantity Factors shown on the Drawings and maintained in accordance with this section prior to installing the foundation. Trenches shall be dewatered and all work performed in a dry trench.
- B. Bedding material shall be spread in maximum of 8-inch layers to the midpoint of the pipe and each layer shall be compacted until the required total depth of the bedding has been built up. Compaction methods include hand tamping with T-bars, flat heads, shovel slicing, as well as mechanical compactors. The Contractor shall perform his bedding operations with care to maintain line and grade.
- C. The pipe foundation above the midpoint of the pipe shall be spread and compacted in 12-inch layers to 12 inches above the top of the pipe. When PVC, plastic or polyethylene pipe is used, do not compact directly over pipe until the depth of backfill has reached 2 feet above the top of the pipe.
- D. Type I - Normal Soil Conditions - Unless shown otherwise in the Drawings, all pipe shall be supported on Type I foundation. The trench shall be excavated from four to eight inches deeper than the bottom of the pipe, depending on the diameter of the pipe (see Table of Quantity Factors shown on the Drawings). Run-of-crusher stone standard bedding, Type "D-R-1" material as described above shall be furnished, placed and compacted in the trench for its full width such that, after the pipe has been uniformly bedded in this material, the required minimum depth of Type "D-R-1" material remains between pipe and undisturbed trench bottom, as noted in the "Table of Quantity Factors." Suitable holes shall be provided in the trench bottom to permit adequate bedding of bells, couplings, or similar projections. The run-of-crusher stone shall extend upward to a point 12 inches over the top of the pipe. Minimum width of pipe foundation shall be outside diameter of pipe plus 2'-0".
- E. Type II - Moderately Unstable Soil Conditions - When specifically called for on the Drawings, or when ordered by the Owner, the pipe shall be supported on Type II foundation. The foundation shall be installed where a suitable supporting soil or rock stratum occurs within two feet, more or less of the bottom of the pipe. The trench shall be excavated to the depth necessary to reach the suitable supporting stratum. Type "D-R-1" material or Type "D-2" crushed stone, as ordered by the Owner as described above, shall then be furnished and placed in the trench for its full width. The material shall be spread in 12-inch layers, and each layer shall be compacted. The pipe foundation material to be supported on Type VII foundation, geotextile fabric foundation. The crushed stone or gravel depth shall extend from the supporting stratum up to an elevation 4, 6 or 8 inches below the bottom of the pipe depending upon the pipe diameter. The bedding material shall then be installed in accordance with Type I pipe foundation requirements.
- F. Type III - Unstable Soil Conditions - When specifically called for on the Drawings, or when ordered by the Owner, the pipe shall be supported on Type III foundation. The foundation shall be installed where no suitable supporting soil or rock stratum exists within two feet of the bottom of the pipe. The trench shall be excavated two feet deeper than the bottom of the pipe. Each side of the trench shall be supported and maintained by a permanent system of tight, continuous sheeting (and bracing) which shall be driven below the trench bottom as shown and which shall extend to an elevation of at least 12 inches above the top of the pipe. Minimum plank size to be 2" x 12" tongue and groove per Section 02250.
- G. Type "D-R-2" material shall then be furnished and placed in the trench for its full width, and to a depth of 8 inches. The pipe foundation material to be supported on a Type VII Foundation, Geotextile Fabric Foundation. Crushed stone, "Type D-3" material shall then be furnished and placed in the trench for its full width. All material shall be spread in layers and each layer shall be compacted until their respective total depths have been built up as

required. The "Type D-3" material depth shall extend a distance of 12 inches from the top of the compacted trench lining up to an elevation 4, 6 or 8 inches below the bottom of the pipe, depending upon the pipe diameter. Bedding material shall then be installed in accordance with Type I Pipe Foundation requirements. All installed sheeting below an elevation established at 12 inches above the top of the pipe shall be left in place and undisturbed. Only the cross struts and walers shall be gradually removed as construction proceeds.

- H. Type IV - Reinforced Concrete Encasement - When specifically called for on the Drawings, or when ordered by the Owner, the pipe shall be supported on Type IV foundation. The trench shall be excavated to a depth below the bottom of the pipe equal to one-quarter of the inside diameter of the pipe or 6 inches, whichever is greater. The excavated space shall then be completely filled with, and the entire pipe encased in, concrete such that the minimum concrete encasement at any point around the outside barrel of the pipe measured 6 inches thick. The total minimum width of the concrete encasement shall equal the outside diameter of the pipe plus 12 inches and such minimum width shall be constant for the entire length of the encasement. Concrete mix, formwork, reinforcing, curing, etc., shall be in accordance with the requirements of Section 03001. Freshly placed concrete shall be maintained free from groundwater and no backfilling of the trench shall begin until initial set has taken place, but not less than 3 hours has elapsed after the encasement has been cast. Backfill a depth of 12 inches over top of concrete before beginning compaction with mechanical equipment.
- I. Type V - Concrete Cradle - When specifically called for on the Drawings or when ordered by the Owner, the pipe shall be supported on Type V foundation. The foundation shall be furnished and installed equal to the Type IV foundation, "Concrete Encasement," except that only that portion of the encasement at and below the horizontal diameter of the pipe shall be encased, forming a true cradle under the bottom half of the pipe. Maintain cradle free from groundwater for a period of 3 hours or until initial set has taken place. Complete pipe foundation in 12-inch lifts as for Type I pipe foundation.
- J. Type VI - Plain Concrete Encasement - When specifically called for on the Drawings, or when ordered by the Owner, the pipe shall be supported on Type VI foundation. The foundation shall be furnished and installed equal to the Type IV foundation, "Reinforced Concrete Encasement," except that no steel reinforcing is required. Maintain encasement free of groundwater for a period of 3 hours or until initial set has taken place.
- K. Type VII - Geotextile Fabric Foundation - When specifically called for on the Drawings, or when ordered by the Owner, the pipe foundation shall be supported on a geotextile fabric foundation. The fabric to be placed on the bottom of the excavated foundation and extended upwards to the top of the Type I pipe foundation where it can then be placed flat with a minimum overlap of 6 inches. Longitudinal overlaps to be a minimum of 2 feet. Fabrics to be installed and stretched tight, have no wrinkles so that the fabric will be in tension when placing the pipe foundation material. Geotextile material to be Trevia Type S 1127 by Hoechst Corporation; Mirafi Type 500X by Celanese Corporation; or equal.
- L. Type VIII - Pressure Pipe Foundation
 - 1. Pipe and fittings shall be laid on stable foundations, free from standing water, and trimmed to shape. Type A-2 material as described above in PART 2 shall be used for pipe foundation unless otherwise shown on the Drawings. In particular, stones 2 inches or larger shall be removed from the bearing surface of the pipe foundation. At the joints, enough depth and width shall be provided to permit the pipe layer to reach entirely around the pipe so that the joints may be made in a proper manner. Pipes shall have full bearing throughout their entire length, which shall be accomplished by shaping the bottom of the ditch or adequately tamping the backfill under the pipe in accordance with Minimum Compaction Requirements, of Section 02316. When laid in tunnels, pipes shall be blocked in such a manner as to take the weight off the bells. Pipe laid in normal trench excavation shall not be laid on wood blocking. Mechanical type joints shall be tightened within the AWWA recommended torque range.

2. The following sources shall be reviewed by the Contractor for installation guidelines and requirements:

PIPE MATERIAL	SOURCES
Ductile Iron	AWWA Standard C600; Section 02510 Project Drawings; manufacturer's recommendations.

3. Unless otherwise shown on the Drawings, as a minimum, all pipe shall be backfilled to the spring line, including hand tamping with T-bars, shovel slicing, and flatheads, and mechanically compacted and the remaining backfill placed in 12-inch lifts to 1 foot above the crown of the pipe in accordance with Minimum Compaction Requirements, of Section 02316. Backfill material within 12 inches of the pipe shall be free of stones greater than 2 inches in any dimension. Unless otherwise shown on the Drawings, the minimum total finished cover over the top of the pipe barrel of all pressure pipe shall be 5 feet.

3.08. GENERAL BACKFILLING REQUIREMENTS

- A. Backfilling shall be started as soon as practicable and after structures or pipe installations have been completed and inspected, concrete has acquired a suitable degree of strength, and subgrade waterproofing materials have been in place for at least 48 hours. Backfilling shall be carried on expeditiously thereafter. Backfill shall be started at the lowest section of the area to be backfilled. Natural drainage shall not be obstructed at any time.
- B. Backfill spaces shall be inspected prior to backfilling operations and all unsuitable materials, including sheeting, bracing forms and debris, shall be removed. No backfill shall be placed against foundation walls on structural members unless they are properly shored and braced or of sufficient strengths to withstand lateral soil pressures.
- C. Backfill material shall be inspected prior to placement and all roots, vegetation, organic matter, or other foreign debris shall be removed. Stones larger than 12 inches in any dimension shall be removed or broken. Stones shall not be allowed to form clusters with voids.
- D. Backfill material shall not be placed when moisture content is more than 2 percent above optimum or is otherwise too high to allow proper compaction. When material is too dry for adequate compaction, water shall be added to the extent necessary.
- E. No backfill material shall be placed on frozen ground nor shall the material itself be frozen or contain frozen soil fragments when placed. No calcium chloride or other chemicals shall be added to prevent freezing. Material incorporated in the backfilling operation which is not in satisfactory condition shall be subject to rejection and removal at the Contractor's expense.
- F. If the Contractor fails to stockpile and protect on-site excavated material acceptable for backfill, then the Contractor shall provide an equal quantity of acceptable off-site material at no expense to the Owner.
- G. Remove surplus backfill material from site.

3.09. EXPLORATORY EXCAVATIONS (TEST PITS)

- A. Where shown or ordered by the owner, the contractor shall excavate and backfill test pits in advance of construction to determine conditions or locations of existing underground utilities/facilities. The contractor shall perform all the work required in connection with excavating stockpiling, maintaining, sheeting, bracing, backfilling and restoring the surface for the exploratory excavations (test pits)

- B. Test pits which the contractor excavates that are not shown on drawings, or specified or ordered shall be at the contractor's expense.
 - C. No test pits will be dug prior to DIGSAFELYNY Utility identification
 - D. Backfill and Fill Materials
 - 1. Excavated materials may be used for backfill provided:
 - a. Material is sandy loamy or similar to bank run gravel
 - b. Material is free from debris hazardous materials frozen materials, organic or the deleterious materials. Materials greater than 4-inches in any direction is unacceptable. Material greater than 2-inches in any direction is unacceptable for backfill directly against the water main.
 - c. Material is reviewed and deemed acceptable by the OWNER
 - 2. Use select granular material within 5 feet or within a 1 on 1 slope from the trench to the edge of pavement of all roadways
 - E. Backfilling shall be in accordance with Section 02320
 - F. Cold Patch for temporary repair shall be placed as directed by OWNER
- 3.10. PIPE TRENCH BACKFILL
- A. Pipe foundations, to a depth of 1 foot above the pipe, shall be placed in 12-inch layers and thoroughly compacted by approved mechanical methods to ensure firm bedding and side support. For plastic or polyethylene pipe materials, do not compact directly over pipe until the 2 feet of cover has been installed. Pipe foundations are specified in the appropriate sections covering underground piping. The remainder of the trench shall be backfilled and consolidated in accordance with Section 02316 and Section 02320 and by one of the following methods, depending on the nature of backfill material and location of trench.
 - B. Procedure I - For cross-country pipelines under uncultivated areas where subsequent settlement can be tolerated:
 - 1. Backfill material shall be placed in the trench and consolidated by packing with the backhoe bucket or other means to prevent voids. Refer to Section 02320 for density requirements. The top layer shall be thoroughly compacted mechanically and slightly mounded to allow for subsequent settlement. Maintain trench surface until completion of contract and regrade as necessary within guarantee period.
 - C. Procedure II - For lawns, cultivated fields, gardens and non-paved areas where minimum subsequent settlement is required: Top of back fill shall be compacted by mechanical means and surface maintained prior to topsoil installation, fine grading, and seeding.
 - D. Procedure III - For streets, driveways, parking areas, highways, shoulder areas, miscellaneous type pavements, walks, curbs, gutters and other specified areas:
 - 1. Backfill material shall be placed in layers not exceeding 18 inches thick and each layer thoroughly compacted by a backhoe mounted hydraulic or vibratory tamper, up to 4 feet under pavement (below top of subgrade). The upper 4 feet shall be compacted using hand-guided or small self-propelled vibratory or static rollers or pads in layers not exceeding 12 inches in thickness. Refer to Section 02320 for density requirements.
 - 2. For pipelines in or across State Highways, backfill material and compaction shall conform to the Standard Specifications or specific requirements of the State in which the project is located.

3. Where a gravel-cement mixture (Type F) backfill is specified, the dry gravel and cement mixture shall be placed in the trench, in 6-inch layers and thoroughly tamped using mechanical or vibratory tampers. Water shall not be introduced to the gravel-cement mixture during placing and compacting thereof.

3.11. BACKFILL FOR STRUCTURES

- A. Backfill shall be placed in layers not exceeding 8-inches thick and thoroughly compacted by mechanical means.
- B. Where pipelines or conduits are to be placed on structural backfill, all backfill under the pipes shall be Size D-2 crushed stone placed in 8-inch layers and mechanically tamped, unless an alternate method of supporting such pipes is specified.
- C. Hydraulic compaction by ponding or jetting will not be permitted except in very unusual conditions and then only upon written request and demonstration of its effectiveness by the Contractor and the written acceptance by the Owner.

3.12. PERIODIC CLEAN-UP; BASIC RESTORATION

- A. When work involves installation of sewers, drains, water mains, manholes, underground structures, or other disturbances of existing features in or across streets, rights-of-way, easements or private property, the Contractor shall (as the work progresses) promptly backfill, compact, grade and otherwise restore the disturbed area to a basic condition which will permit resumption of pedestrian or vehicular traffic and any other critical activity or function consistent with the original use of the land. The requirements for temporary paving of streets, walks, and driveways are specified elsewhere. Unsightly mounds of earth, large stones, boulders and debris shall be removed so that the site presents a neat appearance.
- B. The Contractor shall perform the clean-up work on a regular basis and as frequently as required. Basic site restoration in a particular area shall be accomplished immediately following the installation or completion of the required facilities in that area. Furthermore, such work shall also be accomplished if partially completed facilities must remain incomplete for some time period due to unforeseen circumstances.
- C. Upon failure of the Contractor to perform periodic clean-up and basic restoration of the site to the Owner's satisfaction, the Owner may, upon five days prior written notice to the Contractor, without prejudice to any other rights to remedies of the Owner, cause such work for which the Contractor is responsible to be accomplished to the extent deemed necessary by the Owner, and all costs resulting therefrom shall be charged to the Contractor and deducted from the amounts of money that may be due him.

3.13. TOLERANCES

- A. Top Surface of Backfilling - Under Paved Areas $\pm 1/2$ -inch from required elevations.
- B. Top Surface of General Backfilling - ± 1 -inch from required elevations.

3.14. FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01400.
- B. The Contractor shall designate an experienced person who shall be responsible for inspection of excavations on a daily basis, document, and maintain daily trenching and excavation logs per OSHA 29 CFR 1926.
- C. Tests and analysis of fill material will be performed in accordance with ASTM [D1557] and with Section 02320.

- D. Compaction testing will be performed in accordance with ASTM D1556, ASTM D2922, and with Section 02320.
 - E. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.
 - F. Frequency of Tests – As required by Owner
- 3.15. PROTECTION OF FINISHED WORK
- A. Protect finished Work under provisions of Section 02260.
 - B. Regrade and compact fills subjected to vehicular traffic.

END OF SECTION

SECTION 02319
SELECT GRANULAR MATERIALS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Bedding and Pipe Encasement
- B. Select Backfill

1.02. RELATED SECTIONS

- A. Section 02315 – EXCAVATION
- B. Section 02316 – COMPACTION
- C. Section 02317 – TRENCHING
- D. Section 02318 – ROCK REMOVAL
- E. Section 02741 – ASPHALT PAVING – HOT MIX ASPHALT (HMA)
- F. Section 02900 – RESTORATION

1.03. REGULATORY REQUIREMENTS

- A. NYSDOT Standards, latest revision

1.04. SUBMITTALS

- A. The CONTRACTOR shall furnish representative samples, sieve analysis and certification of specification compliance for the select granular materials to the OWNER and advise on the location of the source.
- B. The CONTRACTOR shall submit copies of proposed materials, methods and operations of backfilling and compaction to the OWNER for review prior to the start of work. A list of equipment to be used in CONTRACTOR'S Methods and Operations must be included

PART 2 PRODUCTS

2.01. PIPE BEDDING AND ENCASEMENT

- A. NYSDOT No. 1 Crushed Stone or Crushed Gravel – bedding for PVC, DIP, HDPE, and CIP piping.
 - 1. Thoroughly washed, clean, sound, tough, hard, crushed limestone conforming to the requirements of NYSDOT Item No. 703.0201 or crushed gravel conforming to the requirements of NYSDOT Item No. 703.0202, having the following gradation by weight:

% Passing	Sieve
100	1 - inch
90-100	½ - inch
0-15	¼ - inch

B. NYSDOT No. 2A Crushed Stone or Crushed Gravel – bedding for DIP and concrete pipe.

1. Shall be a No. 1 and No. 2 blend, thoroughly washed, clean, sound, tough, hard, crushed limestone conforming to the requirements of NYSDOT Item No. 703.0201 or crushed gravel conforming to the requirements of NYSDOT Item No. 703.0202, having the following gradation by weight:

% Passing	Sieve
100	1 ½ - inch
93-100	1 - inch
27-58	½ - inch
0-8	¼ - inch

C. NYSDOT Concrete Sand – bedding for copper tubing.

1. Washed, fine aggregate sand shall conform to the requirements of NYSDOT Item No. 703.07, having the following gradation by weight:

% Passing	Sieve
100	3/8 -inch
90-100	No. 4
70-100	No. 8
50-85	No. 16
25-60	No. 30
10-30	No. 50
1-10	No. 100
0-3	No. 200

2.02. STRUCTURAL AND ROADWAY SELECT BACKFILL

- A. NYSDOT Subbase Type 2 Crusher Run Stone or Crusher Run Gravel. Material shall conform to the requirements of NYSDOT Item No. 304.12, having the following gradation by weight

% Passing	Sieve
100	2 - inch
25-60	¼ - inch
27-58	No. 40
0-8	No. 200

- B. Pea-gravel NYSDOT Type 1A Screened Gravel for the annular space between the carrier pipe and the casing pipe.

1. Screened gravel shall conform to the requirements of NYSDOT Item No. 703.0203 and have the following gradation by weight

% Passing	Sieve
100	½ - inch
90-100	¼ - inch
0-15	1/8 - inch

- C. Follow NYSDOT Standard Specifications if gradation data varies from those listed above.
- D. Recycled concrete or asphalt pavement shall not be allowed.
- E. Slag of any type shall not be allowed.
- F. Flowable fill shall not be allowed unless specified by the OWNER.

PART 3 EXECUTION

3.01. INSTALLATION

- A. Select granular material as specified or directed for watermain bedding or encasement shall be placed in accordance with Section 02315 – Excavation, Section 02316 - Compaction and Section 02317 – Trenching.
- B. Select backfill where specified or directed shall be placed in accordance with the backfilling provisions of Section 02315 – Excavation and Section 02317 – Trenching.

3.02. DISPOSAL OF DISPLACED MATERIALS

- A. Materials displaced through the use of the above materials shall be wasted or disposed of by the CONTRACTOR and the cost of such disposal shall be included in the appropriate bid item.

END OF SECTION

SECTION 02510

WATER DISTRIBUTION PIPING AND APPURTENANCES

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Water main piping including fittings, accessories and materials.
- B. Connection of water mains to existing piping, hydrants, valves, meters, and tanks.
- C. Water services to serve domestic or fire protection.
- D. Installation.

1.02. RELATED SECTIONS

- A. Section 01050 - PAYMENT ITEM DESCRIPTIONS
- B. Section 01200 - SUBMITTALS
- C. Section 01500 - TEMPORARY FACILITIES
- D. Section 01600 - RECORD DOCUMENTS
- E. Section 02260 - PROTECTION OF EXISTING FACILITIES
- F. Section 02316 - COMPACTION
- G. Section 02317 – TRENCHING
- H. Section 02511 - WATER VALVES AND HYDRANTS
- I. Section 02674 - PRESSURE TESTING OF WATER DISTRIBUTION SYSTEMS
- J. Section 02675 - DISINFECTION OF WATER DISTRIBUTION SYSTEMS
- K. Section 03001 - CONCRETE

1.03. REFERENCES

- A. American National Standard Institute (ANSI)
- B. American Water Works Association (AWWA)
- C. American Society for Testing Materials (ASTM)
- D. ANSI A21.4/AWWA C104 Cement-mortar lining for ductile iron and gray iron pipe and fittings for water
- E. ANSI A21.4/AWWA C105 Polyethylene encasement for ductile iron piping for water and other liquids

- F. ANSI A21.10/AWWA C110 Ductile iron and gray iron fittings, 3-inch through 48-inch, for water and other liquids
- G. ANSI A21.11/AWWA C111 Rubber gasket joints for ductile iron and gray iron pressure pipe and fittings
- H. ANSI A21.50/AWWA C150 Thickness design of ductile iron pipes
- I. ANSI A21.51/AWWA C151 Ductile iron pipe centrifugally cast in metal molds and sand lined molds for water and other liquids
- J. AWWA C153, American National Standard For Ductile-Iron Compact Fittings. 3 In. Through 24 Inch And 54 Inch. Through 64 In.
- K. AWWA C600 Installation of ductile iron water mains and their appurtenances
- L. ASTM A126 Gray iron castings for valves, flanges, and pipe fittings
- M. ASTM A536 Standard Specification For Ductile Iron Castings
- N. NSF/ANSI Standard 61
- O. Underwriter's Laboratories (UI)
- P. International Organization For Standardization (ISO)
- Q. Factory Mutual Research Corporation
- R. 1996 Safe Drinking Water Act

1.04. SUBMITTALS

- A. Submit under provisions of Section 01200, Submittals.
- B. Product Data - Provide data describing conformance to ANSI/AWWA/ASTM codes, materials, sizes, class, dimensions, joint type, fittings, and pipe accessories.
- C. Manufacturer's Installation Instructions - Indicate special procedures required to install products specified.
- D. Results of shop tests, if required.
- E. Manufacturer's Certificate - Certify that products meet or exceed specified requirements

1.05. PROJECT RECORD DOCUMENTS

- A. Submit documents under provisions of Section 01600, Record Documents.
- B. Submit marked-up record plans, including record location if different from plan, variations in specified depth of more than +6 inches, record a minimum of two ties on all hydrants, bends, valves, and service connections.
- C. Identify and locate on record drawings the exposed unmapped utilities or services

1.06. REGULATORY REQUIREMENTS

- A. Conform to requirements of regulatory agencies having jurisdiction over the work.
- B. Conform to permit requirements obtained by Owner.

1.07. FIELD MEASUREMENTS

- A. Prior to start of construction, verify by field measurements that existing conditions and structures are as shown on Drawings, notify Owner of specific discrepancies or potential interferences.
- B. Prior to start of construction where ordered, verify by exploratory excavations that existing underground utility locations and elevations are as shown on the Drawings or to confirm marked location and elevation of underground utilities by the organization identified in Section 02260, Protection of Existing Facilities.
- C. Where connections are to be made to existing pipes, confirm the type of material and the outside dimensions of pipes.

1.08. PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. During delivery and handling, all materials shall be braced and protected from any distortion or damage; any such distortion or damage shall be basis for rejection of the materials.
- B. Equipment used for unloading shall be covered with wood or rubber to avoid damage to the exterior of the pipe, fittings and accessories. Do not drop or roll materials off trucks. All ductile iron pipe and fittings shall be handled with padded slings or other appropriate equipment. The use of cables, hooks or chains will not be permitted.
- C. The materials shall be inspected before and after unloading. Materials that are found to be cracked, gouged, chipped, dented or otherwise damaged will not be accepted.
- D. Interiors of pipe, fittings and accessories shall be kept free from dirt and foreign matter.
- E. Store pipe and fittings on heavy wood blocking or platforms so they are not in contact with the ground.
- F. Pipe, fittings, and specials shall be unloaded opposite to or as close to the place where they are to be used as is practical to avoid unnecessary handling

PART 2 PRODUCTS

2.01. DUCTILE IRON PIPE - BURIED

- A. All water main piping shall be ductile iron, except water main installed by horizontal directional drilling.
- B. Pipe material, sizes, classes, etc. shall be furnished and installed as listed herein and as shown on the Drawings.
- C. All products, including wetted parts, shall be certified to meet NSF/ANSI Standard 61
- D. Pipe shall be fully gauged

- E. Pipe shall be ANSI A21.51/AWWA C151 - Ductile Iron Pipe Material, Thickness Class 52, with rubber gasket push-on joints. Fittings shall be mechanical joint conforming to ANSI 21.11/AWWA C111 and ANSI A21.53/AWWA C153.
- F. Ductile iron pipe shall have cement mortar linings for potable water which shall conform to ANSI A21.4/AWWA C104 as follows:
 - 1. Double Thickness - Linings shall consist of cement mortar, centrifugally applied and shall not be less than 1/8 inch for 3 to 12 inches inclusive; 3/16 inch for 14 to 24 inches inclusive, and 1/4 inch for 30 to 54 inches inclusive. The inside shall be given a seal coat of asphalt material as described in ANSI A21.4/AWWA C104.
- G. Protective coatings for ductile iron pipe potable water pipes shall be an asphaltic coating approximately 1 mil thick and conform to requirements of ANSI 21.51/AWWA C151
- H. The exterior of ductile iron pipe shall be coated with a layer of arc-sprayed zinc per ISO 8179. The mass of the zinc applied shall be 200 g/m² of pipe surface area. A finishing layer topcoat shall be applied to the zinc. The coating system shall conform in every respect to ISO 8179-1 "Ductile iron pipes – External zinc-based coating – Part 1: Metallic zinc with finishing layer. Second edition 2004-06-01
- I. Restrained joint pipe shall be designed for a water working pressure of 350 psi for pipe sizes 4-inch through 20-inch and 250 psi for pipe sizes 24-inch through 54-inch.

2.02. DUCTILE IRON PIPE - WITHIN VAULTS/CHAMBERS

- A. Ductile iron pipe and fittings located within vaults shall be the same as buried ductile iron piping, except as noted below.
- B. Joints - Fittings shall be furnished with flanged joints. The type of joint shall meet the following applicable requirements:
 - 1. Flanged Joint
 - a. Flanges shall be screw-on type flanges and the face of the flange shall be machined after installation of the flange onto the pipe.
 - b. No raised surface is allowable on cast iron flanges. Flanges shall be 125-lb. ASA flanges rated for a maximum working pressure of 150 psi.
 - c. The fittings shall be of standard lengths given under the ANSI Specification B16.1, unless otherwise noted.
 - d. The pipe lengths shall be fabricated to meet the requirements of the Drawings.
 - e. Shall be brought to exact alignment and all gaskets and bolts or studs inserted in their proper places.
 - f. Bolts or studs shall be uniformly tightened around the joints.
 - g. Where stud bolts are used, the bolts shall be uniformly centered in the connections and equal pressure applied to each nut on the stud.
 - h. Gaskets shall be ring type, minimum 1/16-inch thick, cloth inserted rubber gaskets.

- i. Flanges shall conform to AWWA Standard C115 (ANSI A21.15) with bolts provided in the size and number called for and in accordance with the American Standard with hexagonal nuts.
- j. For bolt sizes and lengths, the "Handbook of Cast Iron Pipe" should be consulted.
- k. Bolts and hardware shall be Type 316 stainless steel.
- l. Each flanged joint shall have a bead of silicone caulk applied to the full perimeter of the joint after finish painting is completed.

C. Flanged Adapters

- 1. Couplings and flange coupling adaptors shall be unrestrained, unless otherwise shown on the Contract Drawings.
- 2. Where required, flange coupling adapters shall be restrained to process piping by the use of tie rods.
- 3. Couplings and/or adapters shall be provided by the Contractor for the alignment of similar types of pipe or connecting dissimilar pipe materials as required in accordance with the detail shown on the Drawings.
- 4. Couplings and flange adaptors shall be fusion bonded epoxy coated, NSF 61 certified.
- 5. Gaskets shall be NSF 61 certified.
- 6. Bolts and nuts shall be Type 316 stainless steel
- 7. Unions shall be provided adjacent to all pumps, tanks, valves and other pieces of equipment where soldered or screwed joints are utilized
- 8. Where couplings and adapters are to be used they shall be installed in complete accordance with the manufacturer's recommendations

2.03. PIPE ACCESSORIES

A. Fittings

- 1. Same materials, class, coatings and linings as pipe unless under Article 2.01 it was specifically described otherwise. Fittings molded or formed to suit pipe size and end design and in required tee, bends, elbow, couplings, adapters, and other configurations.

B. Where piping is to be installed, above ground or within structures provide adequate supports and bracing by means of hangers, brackets or concrete supports as may be required by the location.

C. Ductile iron anchor coupling shall provide positive joint restraint by incorporating an integrally cast anchor gland (stop shoulder) at one end and an anchor, mechanical joint or plain end at the other end. The plain end, when fitted with a standardized mechanical joint gasket is to be inserted into a mechanical joint bell and bolted tight. A split, rotating ring shall be provided on the elbows, tees and on one end of the couplings or anchor pipe to permit vertical alignment regardless of the mating bolt hole alignment.

D. Couplings

1. shall be Smith-Blair Model 441, Hymax Grip by KRAUSZ, or Alpha by Romac Industries.
2. Couplings shall be provided with stainless steel bolts and hardware

E. Reducers shall be eccentric unless otherwise specified

F. All nuts, bolts and washers for flanges and accessories shall conform to ANSI B18.2.1 and ANSI B18.2.2, respectively and shall be Type 304 stainless steel, high strength, low alloy steel or fluorocarbon coated as specified herein

G. Caps And Plugs

1. Conform to the requirements of AWWA C110 for material, dimensions, tolerance, tests, markings and other requirements.
2. Caps and plugs shall be mechanical joint.
3. All nuts and tee bolts for mechanical joint accessories shall be fluorocarbon coated as specified herein.
4. Threaded outlets or taps, shall be provided in plugs and caps as specified or required.

H. Solid Mechanical Joint Sleeves

1. Conform to the requirements of AWWA C153 for material, dimensions, tolerance, tests, markings, and other requirements of mechanical joint class 350 ductile iron solid sleeves.
2. Unless otherwise specified, provide long laid length sleeves complete with follower glands, rubber gaskets and fluorocarbon coated nuts, tee bolts, and accessories.
3. Manufacturer
 - a. American Cast Iron Pipe Co
 - b. Sigma Corp.
 - c. Star Pipe Products,
 - d. McWane, Inc.
 - e. US Pipe

I. Friction Clamps - Push-On Ductile Iron Pipe Joint Restraining Device

1. Restraining push-on ductile iron pipe joints shall be accomplished by use of a joint restraint system that consists of restraining rods and split ductile iron clamping rings, installed on the spigot and behind the bell. The clamping ring shall incorporate a series of machined serrations on the inside surface to provide 360 degree contact and support of the pipe barrel.

2. Threaded restraining rods and bolts and clamping bolts and nuts shall be fluorocarbon coated or type 304 stainless steel.
3. The joint restraint rings shall be made of high strength, grade 65-45-12 ductile iron conforming to ASTM A536.
4. Dimensions of the gland shall be such that it can be used with the standardized mechanical joint bell conforming to AWWA C111 and AWWA C153.
5. The assembly shall have a rated pressure with a minimum two to one safety factor of 350 PSI in the sixteen inch size and below
6. Manufacturer, for use on ductile iron pipe:
 - a. Uni-Flange Series 1450
 - b. EBAA Series 1700
 - c. Or approved equal.

J. Fluorocarbon Coated Nuts and Bolts

1. T-bolts shall be heat treated ductile iron material with a minimum of 65,000 psi tensile strength and 45,000 psi yield strength meeting ANSI/AWWA C111/A21-95.
2. Nuts and bolts shall have a fluorocarbon SC-1 coating.
3. Manufacturer:
 - a. Standco Industries,
 - b. Or approved equal.

PART 3 EXECUTION

- A. Contractor shall verify all existing conditions.
- B. The drawings and specifications may contain information relating to conditions below the ground surface at the site of proposed work, but such information is furnished without guarantee as to it being complete or correct. The contractor shall assume all risk and responsibilities and shall complete the work in whatever manner and under whatever conditions he may encounter or create without extra cost to the owner. Location of existing underground facilities at or contiguous to the site is based upon information and data furnished to the Owner by owners of such underground facilities or others, and owner does not assume responsibility for the accuracy or completeness thereof. The contractor shall perform exploratory excavations in advance of this work to verify the location, depth, size, and material of existing utilities which may interfere with the work to be performed under this contract. All damage to existing utilities shall be the contractor's cost to repair or replace.
- C. Verify that trench cut, excavated base and pipe bedding are ready to receive pipe and that excavations and pipe bedding dimensions and elevations are as shown on drawings.
- D. All pipe or fittings which have been damaged in transit or which are obviously deformed or refinished in any way shall be rejected, marked, and removed from the site of the work. Any pipe or fitting which the Owner suspects is improper for the job shall be temporarily rejected,

marked, and set aside for subsequent investigation to determine its conformity with the specifications.

- E. All pipe fittings and specials shall be carefully inspected in the field before lowering into the trench. Cracked, broken, warped, out-of-round, damaged pipe joints including damaged pipe lining or coatings or specials, as determined by the Owner, shall be culled out and not installed. Such rejected pipe shall be clearly tagged in such manner as not to deface or damage it, and the pipe shall then be removed from the job site by the contractor at his own expense.

3.02. PREPARATION

- A. The contractor shall have on the job site with each pipe laying crew, all the proper tools, gauges, pipe cutters, lubricants, etc. To handle, cut and join the pipe.
- B. Flat-bottom trenches of required width shall be excavated to the necessary depth as required and maintained in accordance with section 02317 – Trenching and Backfill.
- C. Prior to installing the pipe foundation material, trenches shall have all water removed and all work performed in a dry trench.
- D. All pipes, fittings and specials which are to be installed in the open trench excavation shall be properly bedded in an uniformly supported on pipe foundations of the type specified in section 02317, trenching, and shown on the drawings. In particular, stones 2 inches and larger shall be removed from the bearing surface of the pipe foundation.
- E. Pipe foundation bedding material shall be spread in maximum 8-inch layers and each layer shall be compacted up to the spring line of the pipe.
- F. Compaction methods include hand tamping with t-bars, flat heads, shovel slicing as well as mechanical compactors.
- G. The contractor shall perform his bedding operations with care to maintain line and grades.
- H. Suitable holes or depressions shall be provided in the pipe bedding to permit adequate bedding of bells, couplings, or similar pipe projections.

3.03. LINES AND GRADES

- A. The contractor shall furnish all labor, materials, surveying instruments, and tools to establish and maintain all lines and grades. The contractor shall have personnel on duty or on standby call, at all times, who are qualified to check line and grade of water mains as they are installed.
- B. Easements, property, and other control lines necessary for locating the work are shown on the drawings.
- C. During construction, the contractor shall provide the Owner, at his request, all reasonable and necessary materials, opportunities, and assistance for setting stakes and making measurements, including the furnishing of one or two rodmen or chainmen as needed at intermittent times.
- D. The contractor shall carefully preserve bench marks, reference points and stakes established by the owner, and in case of willful or careless destruction by his own operations he will be charged with the resulting expense to reestablish such destroyed control data and shall be

responsible for any mistakes or delay that may be caused by the unnecessary loss or disturbance of such control data.

- E. The contractor may use laser equipment to assist in setting the pipe provided he can demonstrate satisfactory skill in its use.
- F. The use of string levels, hand levels, carpenter's levels or other relatively crude devices for transferring grade or setting pipe are not to be permitted.

3.04. TOLERANCES

- A. Pipes shall be laid to the lines and grades shown on the drawings.
- B. Minimum depth of cover shall be maintained as shown on the drawings or as described herein.

3.05. INSTALLATION

- A. Installation of ductile iron pipe to be in conformance with AWWA c600 except as modified in this section or referenced sections or as shown on the drawings.
- B. The contractor shall furnish slings, straps and/or approved devices to provide satisfactory support of the pipe when it is lifted. Transportation from storage areas to the trench shall be restricted to operations which can cause no damaged to the pipe or lining or castings.
- C. The pipe shall not be dropped from trucks onto the ground or into the trench.
- D. Each pipe section shall be placed into position in the trench on the pipe bedding in such manner and by such means required to cause no injury to the pipe, persons or to any property.
- E. The method of laying and jointing the pipe shall be in accordance with the recommendations of the manufacturer and as approved by the owner. Each pipe shall be aligned with that already in place, forced home completely with horizontal axial movement and held securely in position. The bell of each pipe length to be laid in the same direction the installation is proceeding.
- F. At the joints, enough depth and width shall be provided to permit the pipe layer to reach entirely around the pipe so that the joints may be made in accordance with the manufacturer's recommendations. Mechanical-type joints shall be tightened within the AWWA recommended torque range.
- G. Pipes, fittings, and specials shall be firmly bedded in the pipe foundation and shall have full bearing throughout their entire length, which shall be accomplished by combination of shaping the bedding and adequately compacting the pipe bedding and backfill under and around the pipe to the spring line of the pipe. The remaining backfill placed in 12-inch lifts to 1-foot above the crown of the pipe in accordance with minimum compaction requirements of section 02316 - Compaction. The remaining backfill is to be installed in accordance with sections 02317 - Trenching, and 02316 - Compaction.
- H. When laid in tunnels, pipes shall be blocked in such a manner as to take the weight off the bells. Pipe laid in normal trench excavation shall not be laid on wood blocking.
- I. Backfill material within 12 inches of the pipe shall be free of stones greater than 2 inches in any dimension.

- J. Unless otherwise shown on the drawings, the minimum total finished cover over the top of the pipe barrel of all pressure pipe shall be 5 feet.
- K. Refer to section 02317 - Trenching and Backfill for other installation guidelines and requirements.
- L. To deflect a pipe joint, first join the pipe in the proper manner and then deflect the pipe within the allowable deflection recommended by the manufacturer.
- M. Install magnetic locating tape, trace wire, minimum 2 inches wide with the words "water line below" along the centerline of the installed water main for the entire length at a maximum depth of 2 feet 0 inches below finished grade.
- N. Mechanical (compression) joining of pipe and fittings is only permissible when joining polyethylene pipe to unlike materials. HDPE stiffeners shall be utilized with all mechanical (compression) fittings. Blocking must be provided at changes in direction for any mechanical fittings. Use of positive restrained joints fittings (non-friction type) is permissible when approved by Owner.

3.06. CONNECTIONS TO EXISTING PIPES

- A. Connections to existing water mains using wet taps (tapping sleeve and valve) shall be provided where shown on the drawings.
- B. Tapping sleeves and tapping valves shall be in accordance with section 02511, water valves and hydrants.
- C. Contractor shall verify outside dimension of existing water main prior to ordering tapping sleeves or couplings.
- D. Coordinate shutdown of existing water mains (where permitted) with the owner. Provide proposed work sequence and timeline for owner and Owner review a minimum of five working days prior to proposed shutdown.

3.07. BRACING AND BLOCKING

- A. All bends, tees, crosses, plugs, etc., shall be braced and blocked with wood and then anchored with concrete thrust blocks so that there will be no movement of the pipe in the joints due to the internal or external pressures.
- B. The concrete shall be placed around the fittings and completely fill the space between the fittings and walls of the trench, from 6 inches below the fittings of pipe to 12 inches above the fittings and in accordance with the dimensions and details shown on the drawings.
- C. The anchor concrete shall be so placed that the bell and spigot joints or other joints may be tightened, if necessary.
- D. Steel ties to be used only where shown on the drawings.
- E. Prior to installation of the concrete anchor, the contractor shall wrap all fittings with a minimum of 8-mil thick polyethylene.
- F. Refer to details shown on the drawings.

- G. Cast-in-place concrete used in constructing concrete thrust blocks shall conform to requirements specified in section 03001, concrete.
- H. Measuring, mixing, transporting and placing of concrete shall conform to American Concrete Institute (ACI) publication 304.
- I. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- J. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

3.08. TEMPORARY PLUGGING

- A. At all times when pipe laying is not actually in progress, the open ends of the pipes shall be closed temporarily with pipe plugs or by other means such that there is no possibility of any water or foreign material entering the line. If water is in the trench when work is resumed, the plugs shall not be removed until the water has been removed and work can proceed in a dry stable trench.

3.09. CLEANING PIPELINE

- A. At the conclusion of the work, the contractor shall thoroughly clean all new pipes by flushing with water or other means to remove all dirt, stones, pieces of wood, etc., which may have entered during the construction period.
- B. Pipes shall be flushed at a minimum rate of 2.5 feet per second for a suitable duration.
- C. If, after this cleaning, any obstructions remain, they shall be corrected to the satisfaction of the Owner.
- D. Where required, the contractor shall use mechanical methods to clean pipes when flushing does not remove all obstructions or material.

3.10. PRESSURE TESTING AND FLUSHING

- A. Pressure testing and flushing of the water mains shall be performed in accordance with section 02674 - Pressure Testing of Water Distribution Systems.
- B. Any section of pipe that fails the pressure test shall be dug up and replaced or permanently repaired as approved by the Owner. All repairs and/or replacements shall be the contractor's cost. The replaced or repaired section shall then be retested.

3.11. DISINFECTION

- A. Disinfection of water mains shall be performed in accordance with section 02675, Disinfection of Water Distribution Systems.

3.12. ENCASEMENT

- A. Where shown on the drawings, pipes shall be encased in concrete; details and requirements for encasement of pipes are described in section 02317 – Trenching, and shown on the drawings.

- B. Requirements for encasement of pipes 10 inches and smaller, shown under a base slab, are described in section 02317 – Trenching.

3.13. SERVICE CONNECTIONS

- A. When shown on the contract drawings, or ordered by the Owner, water services shall be furnished and installed, and to the extent shown or ordered by the owner as specified in Section 02512, Water Services and Appurtenances.

3.14. VALVES AND HYDRANTS

- A. Valves and hydrants to be installed on this project are specified in Section 02511, Water Valves and Hydrants.
- B. Valve and hydrant details for connection to the water main are shown on the Standard Drawings.

3.15. MAGNETIC PIPE MARKING TAPE

- A. Magnetic pipe marking tape as manufactured by C. H. Hanson Products, Paul Potter Warning Tape, or approved equal shall be installed above all new water main.
- B. Tape shall be 3 inches wide consisting of two (2) exterior plies of polyethylene with an aluminum alloy foil core.
- C. Tape shall be blue color and labeled: "WATER" in black letters.

3.16. THRUST RESTRAINTS

- A. Thrust restraints for water mains shall be accomplished by the use of both thrust blocks and mechanical restraints for sizes through 12 inches. Joints for water mains 16 inches and larger shall have thrust restraints provided by harnessed joints only. Restraints shall be in the form of retainer glands; ductile iron locking segments with spigot weldment; or anchors of the size and type specified or as required by the pressure and stability of the supporting surface.
- B. Thrust restraints shall be installed at all changes in direction, changes in size, dead ends or other locations where shown or directed.
- C. Valves shall be treated as a bulkhead condition and pipe joints shall be restrained on both sides of the valve.
- D. Cast in place concrete used for thrust restraints shall have developed the required strength prior to testing of the water main.
- E. When approved for use by OWNER, tie rods and nuts for thrust restraints shall be of high tensile steel and shall have minimum yield strength of 70,000 psi.
- F. Tie rods and nuts installed underground shall be coated with two coats of coal tar pitch preservative coating after installation.
- G. Oil, grease, paint, or any coating which requires drying will not be acceptable.
- H. All fire hydrant branches from the mainline tee to and including valve and hydrant shall be restrained.

- I. All piping installed for interconnections shall be restrained.
- J. All piping installed within casing pipes shall be restrained for the full length of the pipe installed within the casing pipe.
- K. All piping installed within the limits of creek crossings shall be restrained for the full length of the creek crossing limits.

3.17. SERVICE CONNECTIONS

- A. Connections to in-service pressure water mains shall be in accordance with the applicable provisions of Section 02512 – Water Services and Appurtenances.

3.18. CONCRETE THRUST BLOCKS

- A. Solid concrete blocks shall be used for proper blocking. Hollow concrete blocks or wooden blocking are not acceptable. Cast-in-place wet concrete mix shall be used for vertical bends and anchor collars.

END OF SECTION

SECTION 02511
WATER VALVES AND HYDRANTS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Furnishing the several types of valves and stops.
- B. Hydrants.
- C. Valve operators.
- D. Valve boxes.
- E. Installation.
- F. Testing and disinfection.

1.02. RELATED SECTIONS

- A. Section 01050 - PAYMENT ITEM DESCRIPTIONS
- B. Section 01200 - SUBMITTALS
- C. Section 01500 - TEMPORARY FACILITIES
- D. Section 01600 – RECORD DOCUMENTS
- E. Section 02316 - COMPACTION
- F. Section 02317 – TRENCHING
- G. Section 02510 - WATER DISTRIBUTION PIPING AND APPURTENANCES
- H. Section 02674 - PRESSURE TESTING OF WATER DISTRIBUTION SYSTEMS
- I. Section 02675 - DISINFECTION OF WATER DISTRIBUTION SYSTEM
- J. Section 03001 - CONCRETE

1.03. REFERENCES

- A. American National Standard Institute (ANSI)
- B. American Water Works Association (AWWA)
- C. American Society for Testing Materials (ASTM)
- D. AWWA C500 Gate Valves For Water And Sewerage Systems
- E. AWWA C502 Dry Barrel Fire Hydrants

- F. AWWA C504 Rubber Seated Butterfly
- G. AWWA C506 Backflow Prevention Devices
- H. AWWA C507 BALL VALVES 6 INCHES THROUGH 48 INCHES
- I. AWWA C508 SWING CHECK VALVES FOR WATERWORKS SERVICE
- J. AWWA C509 RESILIENT-SEATED GATE VALVES FOR WATER SYSTEMS
- K. AWWA C550 PROTECTIVE INTERIOR COATINGS FOR VALVES AND HYDRANTS
- L. ASTM A126 GRAY IRON CASTINGS
- M. ASTM A48 GRAY IRON CASTINGS FOR VALVES, FLANGES AND PIPE FITTINGS
- N. NSF/ANSI Standard 61
- O. 1996 Safe Drinking Water Act

1.04. SUBMITTALS

- A. Submit under provisions of Section 01200, Submittals.
- B. Product Data - Provide data describing conformance to ANSI/AWWA/ASTM codes, materials, sizes, class, dimensions, joint type, fittings, and pipe accessories.
- C. Manufacturer's Installation Instructions - Indicate special procedures required to install products specified.
- D. Manufacturer's Certificate - Certify that products meet or exceed specified requirements

1.05. PROJECT RECORD DOCUMENTS

- A. Submit documents under provisions of Section 01600, Record Documents.
- B. Submit marked-up record plans, including record location if different from plan, variations in specified depth of more than +6 inches, record a minimum of two ties on all hydrants, bends, valves, and service connections.
- C. Identify and locate on record drawings the exposed unmapped utilities or services

1.06. REGULATORY REQUIREMENTS

- A. Conform to requirements of regulatory agencies having jurisdiction over the work.
- B. Conform to permit requirements obtained by Owner.

PART 2 PRODUCTS

2.01. MATERIALS

- A. Valve size, type of valve, joint type, class, lining, coatings shall be installed as listed herein
- B. Valves shall be of standard manufacturer and of highest quality, both as to material and workmanship, conforming to the latest edition of AWWA standards specified.
- C. All valves and hydrants shall have the manufacturer's name monogrammed or initialed by the manufacturer thereon and shall be identified by catalog numbers.
- D. All valves shall be provided with hub, spigot, mechanical joint, flange or screwed ends as described herein.
- E. Valves, 2 inches in nominal diameter and smaller shall be all brass or bronze.
- F. Valves over 2 inches in nominal diameter shall be iron bodied, fully brass or bronze mounted.
- G. All surface forming joints or bearing surfaces shall be machined to a perfect fit.
- H. All disc and seat rings shall be carefully and thoroughly secured in place with the iron castings machined where the rings are bare and the backs of the rings machined all over.
- I. After the rings have been fastened securely in place, the front shall be machined all over to a perfectly true and smooth bearing surface.
- J. All valves with non-rising stems shall have valve position indicators.
- K. Valves shall open clockwise (right) unless otherwise specified

2.02. GATE VALVES

- A. Gate valves 2 inches and smaller shall be bronze gate valves with rising stem, double wedge disc, screwed bonnet, screwed ends, 125-pound rating, and shall be re-packable under pressure in full open position.
- B. All gate valves 2 inches and smaller shall be Stockham Figure 107; Lunkenheimer Figure 2127; or equal.
- C. All other interior gate valves shall conform to AWWA Standard C500 and shall be of iron body, bronze mounted, double-disc type with outside screws and yokes and have 125 pound ANSI flanged ends.
 - 1. Valves shall be constructed with bolted bonnets, provided with cast iron stuffing boxes having bolted followers.
 - 2. The stuffing boxes shall be so arranged as to be readily accessible and shall be packed ready for use with synthetic fiber, graphite impregnated stuffing.
- D. Stems shall be fabricated of brass or bronze with the lath-cut, half-V pattern threads. Double-disc type gate valves shall be Kennedy Valve Manufacturing, Mueller, or equal.
- E. All interior gate valves shall be equipped with hand wheel operators unless otherwise specified. Hand wheel or chain and wheel operators shall be replaceable with 2-inch operating nuts without replacing the valve stem or removing the bevel gears.

- F. All underground gate valves shall be non-rising stems, 2 inch operating nuts, O-ring seal and shall open clockwise (right).
 - 1. Underground gate valves shall be of the iron body, bronze mounted type conforming to AWWA Standard C500.
 - 2. Mechanical joint type designed for underground use at 150 psi.
 - 3. Underground gate valves shall be Mueller, Kennedy Valve Manufacturing Company, or equal. Pipe material, sizes, classes, etc. shall be furnished and installed as listed herein and as shown on the Drawings.

2.03. RESILIENT SEATED GATE VALVES

- A. Resilient seated gate valve shall conform to all applicable provisions of Articles 2.01 and 2.02 of this section.
- B. All resilient seated gate valves shall provide a full pipe opening when fully opened.
- C. Resilient seated gate valves shall conform to AWWA Standard C509.
- D. All resilient seated gate valves shall be as manufactured by Kennedy Valve Manufacturing, Mueller, or equal.
- E. All products, including wetted parts, shall be certified to meet NSF/ANSI Standard 61

2.04. CORPORATION STOPS AND CURB STOPS

- A. For corporation and curb stops for water services Refer to Section 02512.

2.05. VALVE BOXES

- A. Valve boxes shall be provided for all buried valves unless they are housed in valve chambers.
- B. Valve boxes shall be made of good quality cast iron and shall be of the sectional adjustable type. The long section shall be a minimum of 5 inches in inside diameter and fit around the stuffing box of the valve; or over the valve operator, if a two-section box is used; or to fit a circular or oval-base section if a three-section box is used.
- C. The upper section shall be arranged to screw on over the adjoining long section and shall also be full diameter. Screw-type valve boxes shall be used unless otherwise specified. Valve boxes shall be provided with cast iron lids or covers.
- D. Lids or covers shall be marked for the service for which the valve is used by casting words such as "WATER" for potable water system. An arrow shall be provided on the cover to indicate the direction in which the valve is turned to open; this arrow shall be labeled with the word "OPEN".
- E. The overall length of each valve box shall be sufficient to permit the top of the box to be set flush with the established finished grade. In asphalt concrete pavements, the top of the box to be set 1/2-inch below finished grade. Asphalt concrete to be compacted 12 inches wide around the upper section for a depth of 12 inches below finished grade.

- F. Valve boxes shall be set truly vertical and fully supported until sufficient backfill has been placed and compacted to ensure vertical alignment of the box.

2.06. HYDRANTS

- A. All hydrants shall be of the compression or gate type conforming to the latest specifications of the ANSI/AWWA C502, and shall be of a make that has been adopted by the Owner as a standard.
- B. Hydrants shall be of heavy, anti-freeze compression action type with positive automatic type drain.
- C. All hydrants shall breakaway at ground level upon severe impact without flooding the area.
- D. Hydrants shall be supplied with 6-inch mechanical joint inlet connection.
- E. Hydrants shall have a minimum 5-inch diameter valve opening. They shall be equipped with two 2-1/2-inch hose nozzles and one 4-1/2-inch steamer nozzle. Both 2-1/2-inch hose nozzles shall be Syracuse Pipe Thread. The 4-1/2-inch steamer nozzle shall be National Standard Thread.
- F. Operating nuts shall be 1-1/8-inch pentagon nuts.
- G. Hydrant barrels shall be painted red
- H. Caps shall be furnished with non-kinking chains.
- I. Hydrants shall open counter-clockwise (left).
- J. Hydrants shall be designed for 300# test pressure and 150# working pressure.
- K. Hydrants shall be Kennedy K-81 D or approved equal.
- L. Hydrant signs shall be minimum 4-inch by 6-inch heavy duty 18 gauge steel with baked enamel finish labeled with hydrant symbol in red with a white background. Signs shall be mounted on a 10 foot long green baked enamel U channel sign post. Sign and posts shall be installed 18 inches behind hydrants.

2.07. TAPPING SLEEVES AND VALVES

- A. Tapping sleeves shall be compatible with the pipe encountered so that a watertight connection will be made.
- B. Tapping sleeves shall be ductile iron construction with Type 304 stainless steel bolts and hardware. Sleeve body shall have an NPT test plug for hydrostatic testing. Sleeves shall have an outlet flange with dimensions and drilling that comply with ANSI B16.1, Class 125 and with MSS SP-60. Sleeve shall be rated for a maximum working pressure of 250 psi.
- C. The sleeve shall be adequate to provide reinforcement of the pipe being tapped and protect this pipe against all strains resulting from either tapping the pipe or connecting to the pipe.
- D. Tapping valves used shall conform to Article 2.03.

- E. Tapping sleeves for this project shall be Model H-615 as manufactured by Mueller Company or equal.
- F. Tapping valves shall be Kennedy Model C509 resilient seated wedge gate valve with flange x mechanical joint connections. No substitutes will be accepted.
- G. Mechanical joint connection shall be provided with restraint gland.
- H. The tapping contractor shall have a minimum of five years' experience in performing taps.
- I. After the sleeve has been installed, but prior to making the tap, the sleeve shall be subjected to a hydrostatic test equal to the maximum line pressure. There shall be no observed leakage from the sleeve.

PART 3 EXECUTION

- A. Contractor shall verify all existing conditions.
- B. The drawings and specifications may contain information relating to conditions below the ground surface at the site of proposed work, but such information is furnished without guarantee as to it being complete or correct. The contractor shall assume all risk and responsibilities and shall complete the work in whatever manner and under whatever conditions he may encounter or create without extra cost to the owner. Location of existing underground facilities at or contiguous to the site is based upon information and data furnished to the engineer by owners of such underground facilities or others, and owner and engineer do not assume responsibility for the accuracy or completeness thereof.
- C. The contractor shall perform exploratory excavations in advance of this work to verify the location, depth, size, and material of existing utilities which may interfere with the work to be performed under this contract. All damage to existing utilities shall be the contractor's cost to repair or replace.
- D. Verify that trench cut, excavated base and pipe bedding are ready to receive pipe and that excavations and pipe bedding dimensions and elevations are as shown on drawings.
- E. All pipe or fittings which have been damaged in transit or which are obviously deformed or refinished in any way shall be rejected, marked, and removed from the site of the work. Any pipe or fitting which the Owner suspects is improper for the job shall be temporarily rejected, marked, and set aside for subsequent investigation to determine its conformity with the specifications.
- F. All pipe fittings and specials shall be carefully inspected in the field before lowering into the trench. Cracked, broken, warped, out-of-round, damaged pipe joints including damaged pipe lining or coatings or specials, as determined by the engineer, shall be culled out and not installed. Such rejected pipe shall be clearly tagged in such manner as not to deface or damage it, and the pipe shall then be removed from the job site by the contractor at his own expense.
- G. All new and existing valve boxes, curb boxes, etc., shall be adjusted so that the cover is flush with the top of grade.
 - 1. All valve boxes, curb boxes, etc., shall be left in such a way that the covers are easily removed and the boxes shall function in the manner in which they were intended.

2. All covers shall be cleaned and restored to their original condition, free from dirt, concrete, and asphalt.

3.02. PREPARATION

- A. Prior to installing the foundation, trenches shall have all water moved and all work performed in a dry stable trench.
- B. Flat-bottom trenches of required width shall be excavated to the necessary depth as required and maintained in accordance with Section 02317 - Trenching.
- C. Prior to installing the pipe foundation material, trenches shall have all water removed and all work performed in a dry trench.
- D. All pipes, fittings and specials which are to be installed in the open trench excavation shall be properly bedded in an uniformly supported on pipe foundations of the type specified in Section 02317 – Trenching, and shown on the drawings. In particular, stones 2 inches and larger shall be removed from the bearing surface of the pipe foundation.
- E. Compaction methods include hand tamping with T-bars, flat heads, and shovel slicing as well as mechanical compactors.
- F. The contractor shall perform his bedding operations with care to maintain line and grades.

3.03. LINES AND GRADES

- A. The contractor shall furnish all labor, materials, surveying instruments, and tools to establish and maintain all lines and grades. The contractor shall have personnel on duty or on standby call, at all times, who are qualified to check line and grade of water mains as they are installed.
- B. Easements, property, and other control lines necessary for locating the work are shown on the drawings.
- C. The contractor shall carefully preserve bench marks, reference points and stakes established by the engineer or owner, and in case of willful or careless destruction by his own operations he will be charged with the resulting expense to reestablish such destroyed control data and shall be responsible for any mistakes or delay that may be caused by the unnecessary loss or disturbance of such control data.

3.04. TOLERANCES

- A. Minimum depth of cover shall be maintained as shown on the Standard Details or as described herein.

3.05. INSTALLATION

- A. The Contractor shall furnish slings, straps, and/or approved devices to provide satisfactory support of the valves or hydrants when lifted. Transportation from storage areas to the trench shall be restricted to operations which can cause no damaged to the coating or lining or castings.
- B. The valves or hydrants shall not be dropped from trucks onto the ground or into the trench.

- C. All valves shall be installed in accordance with the specifications for the pipe to which they are to be connected and as previously described for individual types of valves.
- D. Joints of valves shall be made up in accordance with the Contract Drawings and/or as described under the appropriate pipe joint descriptions found in other sections of these specifications.
- E. The valves shall be so located that they are accessible for operating purposes and shall bear no stresses due to loads from the adjacent pipe.
- F. All valves shall be inspected before installation, and they shall be cleaned and well lubricated before being installed in the line.
- G. Hydrants shall be set at locations specified on the Contract Drawings and shall be of such length that, with the frost ring at the ground surface grade, there shall be 5 feet of cover over the connecting pipe.
- H. Hydrants shall be set so that the barrel is truly vertical, and shall be properly backfilled so that the barrel will remain truly vertical.
- I. They shall be placed with 3 cubic feet of crushed stone pocket to provide drainage for the hydrant.

3.06. CONNECTIONS TO EXISTING PIPES

- A. Connections to existing water mains using wet taps (tapping sleeve and valve) shall be provided where shown on the drawings.
- B. Tapping sleeves and tapping valves shall be in accordance with Section 02511 - Water Valves and Hydrants.
- C. Contractor shall verify outside dimension of existing water main prior to ordering tapping sleeves or couplings.
- D. Coordinate shutdown of existing water mains (where permitted) with the owner. Provide proposed work sequence and timeline for owner and engineer review a minimum of five working days prior to proposed shutdown.

3.07. PRESSURE TESTING AND FLUSHING

- A. Pressure testing and flushing of the water mains shall be performed in accordance with Section 02674 - Pressure Testing of Water Distribution Systems.
- B. Any section of pipe that fails the pressure test shall be dug up and replaced or permanently repaired as approved by the engineer. All repairs and/or replacements shall be the contractor's cost. The replaced or repaired section shall then be retested.

3.08. DISINFECTION

- A. Disinfection of water mains shall be performed in accordance with Section 02675 - Disinfection of Water Distribution Systems.

3.09. ENCASEMENT

- A. Where shown on the drawings, pipes shall be encased in concrete; details and requirements for encasement of pipes are described in Section 02317 – Trenching, and shown on the drawings.

3.10. MAGNETIC PIPE MARKING TAPE

- A. Magnetic pipe marking tape as manufactured by C. H. Hanson Products, Paul Potter Warning Tape, or approved equal shall be installed above all new water main.
- B. Tape shall be 3 inches wide consisting of two (2) exterior plies of polyethylene with an aluminum alloy foil core.
- C. Tape shall be blue color and labeled: "WATER" in black letters.

3.11. THRUST RESTRAINTS

- A. Thrust restraints shall be installed at all changes in direction, changes in size, dead ends or other locations where shown or directed.
- B. Valves shall be treated as a bulkhead condition and pipe joints shall be restrained on both sides of the valve.
- C. Cast in place concrete used for thrust restraints shall have developed the required strength prior to testing of the water main.
- D. When approved for use by Owner, tie rods and nuts for thrust restraints shall be of high tensile steel and shall have minimum yield strength of 70,000 psi.
- E. Tie rods and nuts installed underground shall be coated with two coats of coal tar pitch preservative coating after installation.
- F. Oil, grease, paint, or any coating which requires drying will not be acceptable.
- G. All fire hydrant branches from the mainline tee to and including valve and hydrant shall be restrained.
- H. All piping installed for interconnections shall be restrained.

3.12. CONCRETE THRUST BLOCKS

- A. Refer to section 03001, Concrete.
- B. Solid concrete blocks shall be used for proper blocking. Hollow concrete blocks or wooden blocking are not acceptable.

END OF SECTION

SECTION 02512

WATER SERVICES AND APPURTENANCES

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Water service piping, fittings, and accessories
- B. Connection to existing water mains
- C. Water services to serve domestic or fire protection
- D. Installation

1.02. REFERENCES AND STANDARDS

- A. American Water Works Association
- B. U.S. Environmental Protection Agency – Safe Drinking Water Act
- C. National Sanitation Foundation - Standard 61
- D. American National Standard Institute (ANSI)
- E. ASTM B88 – Copper Pipe Type K
- F. AWWA C800 Underground Service Line Valves and Fittings (with Type K Copper Tubing)
- G. American Society for Testing Materials (ASTM)

1.03. RELATED SECTIONS

- A. Section 01200 - SUBMITTALS
- B. Section 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS
- C. Section 01600 - RECORD DOCUMENTS
- D. Section 02260 - PROTECTION OF EXISTING FACILITIES
- E. Section 02316 - COMPACTION
- F. Section 02317 – TRENCHING
- G. Section 02511 - WATER VALVES AND HYDRANTS
- H. Section 02674 - PRESSURE TESTING WATER DISTRIBUTION SYSTEMS
- I. Section 02675 - DISINFECTION WATER DISTRIBUTION SYSTEMS
- J. Section 03001 – CONCRETE

1.04. REGULATORY REQUIREMENTS

- A. Conform to requirement of regulatory agencies having jurisdiction over work
- B. Conform to permit requirements obtained by Owner and attached to these specifications

1.05. SUBMITTALS

- A. Submit under provisions of Section 01200.
- B. Product Data - Provide data describing conformance to ANSI/AWWA/ASTM codes, materials, sizes, class, dimensions, joint type, fittings, and pipe accessories
- C. Manufacturer's Installation Instructions - Indicate special procedures required to install products specified.
- D. Results of shop tests, if required.
- E. Manufacturer's Certificate - Certify that products meet or exceed specified requirements.

1.06. FIELD MEASUREMENTS

- A. Prior to start of construction where ordered, verify by exploratory excavations that existing underground utility locations and elevations are as shown on the Drawings or to confirm marked location and elevation of underground utilities by the organization identified in Section 02260.
- B. Where connections are to be made to existing pipes, confirm the type of material and the outside dimensions of pipes

PART 2 PRODUCTS

2.01. MATERIALS

- A. All valves shall be provided with hub, spigot, mechanical joint, flange or screwed ends as described herein.
 - 1. Valves, 2 inches in nominal diameter and smaller shall be all brass or bronze.
 - 2. Valves over 2 inches in nominal diameter shall be iron bodied, fully brass or bronze mounted

2.02. CORPORATION STOPS

- A. Corporation stops shall be of brass or bronze construction and shall be installed by the wet method, connecting service line to water mains, with water main at or near operating pressure when corporation stops are installed.
- B. Corporation stops shall be installed by experienced tradesmen using the proper tools especially designed for a wet-tap connection.
- C. Corporation stops shall be installed in complete accordance with the pipe manufacturer's recommendations for tapping and installing corporation stops.

- D. Saddles shall be used where recommended by the pipe manufacturer or as ordered by the Owner, and such saddles shall be approved for use with the pipe by the pipe manufacturer. Threads of service saddle shall be compatible with the corporation stop specified. Saddles shall be of double strap design.
- E. Contractor shall verify diameter and pipe material ahead of time. Saddles shall be made of either brass or bronze and shall be as manufactured by Mueller Company, Ford Meter Box Company, or equal. All saddles shall be field wrapped with a polyethylene sheet.
- F. Where saddles are used, or for other reasons the main cannot be tapped wet, the Owner may approve visual inspection of such connections after they have been pressurized.
- G. Buried corporation stops shall be Model H-15000 as manufactured by Mueller Company, or Model F-600 as manufactured by Ford Meter Box Company, or equal. Corporation stops located within pits or vaults shall be Model H-10045 or H-9992 with I.P. outlet as manufactured by Mueller Company, or Model F800 or F1600 with I.P. outlet as manufactured by Ford Meter Box Company, or equal.

2.03. CURB STOPS

- A. Curb stops shall be of brass or bronze construction and two rubberized O-ring seals to provide pressure-tight seal. Curb stops shall be Figure H-15204 as manufactured by Mueller-Oriseal, B22 as manufactured by Ford Meter Box Company, Hayes, Nuseal, or equal.

2.04. CURB BOX

- A. Curb boxes shall be 2-1/2-inch shaft size two-piece screw type. They shall be adjustable from 48-inch to 72-inch. Curb boxes shall be constructed of cast iron and thoroughly coated with two coats of asphaltum varnish.
- B. Curb box top section shall include a water cover which shall be of the "old style" with the word "water" cast into it and shall include a brass pentagon screw.
- C. Curb boxes shall be as manufactured by Ford Meter Box Company, Mueller Company, or equal

2.05. COOPER SERVICE PIPING (SERVICE SIZE 1-INCH TO 2-INCH)

- A. Copper Pipe - ASTM B-88, Type K material for underground services 1 inch to 2 inch.
- B. Fitting shall be flare-type fittings in conformance with AWWA C800.
- C. Joints - Copper joints shall be thoroughly cleaned and the end of pipe uniformly flared by a suitable tool to the bevel of the fitting used. Wrenches shall be applied to the bodies of the fittings where the joint is being made and, in no case to a joint previously made.

2.06. DUCTILE IRON WATER SERVICE (2-INCH AND GREATER)

- A. All ductile Iron water services shall comply with Specification 02510 - Water Distribution Piping and Appurtenances.

2.07. IDENTIFICATION.

- A. Each pipe length and fitting shall be clearly marked with:

1. Manufacturer's name and trademark.
2. Nominal pipe size and class.
3. Material Designation.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Contractor shall verify all existing conditions.
- B. The drawings and specifications may contain information relating to conditions below the ground surface at the site of proposed work, but such information is furnished without guarantee as to it being complete or correct. The Contractor shall assume all risk and responsibilities and shall complete the work in whatever manner and under whatever conditions he may encounter or create without extra cost to the Owner. Location of existing underground facilities at or contiguous to the site is based upon information and data furnished to the Owner by owners of such underground facilities or others, and Owner does not assume responsibility for the accuracy or completeness thereof. The Contractor shall perform exploratory excavations in advance of this work to verify the location, depth, size, and material of existing utilities which may interfere with the work to be performed under this contract. All damage to existing utilities shall be the Contractor's cost to repair or replace.
- C. Verify that trench cut, excavated base and pipe bedding are ready to receive pipe and that excavations and pipe bedding dimensions and elevations are as shown on Drawings.
- D. All pipe or fittings which have been damaged in transit or which are obviously deformed or refinished in any way shall be rejected, marked, and removed from the site of the work. Any pipe or fitting which the Owner suspects is improper for the job shall be temporarily rejected, marked, and set aside for subsequent investigation to determine its conformity with the specifications.
- E. All pipe fittings and specials shall be carefully inspected in the field before lowering into the trench. Cracked, broken, warped, out-of-round, damaged pipe joints including damaged pipe lining or coatings or specials, as determined by the Owner, shall be culled out and not installed. Such rejected pipe shall be clearly tagged in such manner as not to deface or damage it, and the pipe shall then be removed from the job site by the Contractor at his own expense.

3.02. PREPARATION

- A. The Contractor shall have on the job site with each pipe laying crew, all the proper tools, gauges, pipe cutters, lubricants, etc. to handle, cut and join the pipe.
- B. Flat-bottom trenches of required width shall be excavated to the necessary depth as required and maintained in accordance with Section 02317 - Trenching.
- C. Prior to installing the pipe foundation material, trenches shall have all water removed and all work performed in a dry trench.
- D. All pipes, fittings and specials which are to be installed in the open trench excavation shall be properly bedded in a uniformly supported on pipe foundations of the type specified in Section

02317 and shown on the Drawings. In particular, stones 2 inches and larger shall be removed from the bearing surface of the pipe foundation.

- E. Pipe foundation bedding material shall be spread in maximum 8-inch layers and each layer shall be compacted up to the spring line of the pipe.
- F. Compaction methods include hand tamping with T-bars, flat heads, and shovel slicing as well as mechanical compactors.
- G. The Contractor shall perform his bedding operations with care to maintain line and grades.
- H. Suitable holes or depressions shall be provided in the pipe bedding to permit adequate bedding of bells, couplings, or similar pipe projections.

3.03. INSTALLATION

- A. When shown on the Contract Drawings, or ordered by the Owner, water services shall be furnished and installed to the extent shown or ordered by the Owner. Means and methods used must meet all applicable codes, and the Owner has final approval of means and methods used.
- B. Corporations shall be installed in the "run" of the water main at the required locations or, if the pipe is required to be tapped to receive special saddles, such fittings shall be located at the required locations and installed as specified, and in a manner satisfactory to the Owner. The requirements for proper pipe foundation, bedding, joint assembly, etc., shall be observed when installing the water services. All corporation installations shall be "wet" taps.
- C. After installation, water services shall be thoroughly flushed and shall not be backfilled until the installation has been observed and approved by the Owner and their location has been measured and recorded by the Contractor on a standard form (see Form #158 at end of this Section) provided by the Owner, and such record shall then be transmitted to the Owner with the record drawings.
- D. Contractor shall repair any indoor plumbing problems within residence as a result of his work performed. A licensed plumber shall make all necessary repairs and all work shall be the Contractor's cost

Contract No. _____

Contractor: _____

CHECKLIST FOR WATER SERVICE CONNECTION

(To Be Completed by Contractor)

Date: _____

Street: _____ House No.: _____

Name: _____

Describe Location if No House Number: _____

ITEM	YES	NO	LOCATION SKETCH
1. Connection to Water Main:			
(a) Tapped directly into Pipe Barrel			
(b) Saddle			
2. Service Pipe Installed:			
(a) Using copper pipe			
(b) Curb stop installed			
(c) Curb box installed			
3. Connection to House Line:			
4. Diameter of Service Connection:			
5. Diameter of Water Main:			
6. Depth of Curb Stop:			
7. Service Ties:			

INSTRUCTIONS:

1. Complete every space accurately.
2. Show house, street, and water main.
3. Show two permanent radius ties to curb stop.
4. Show North Arrow.
5. Show diameter of Main.
6. Copies for Owner.

CHECKED AND APPROVED: _____

END OF SECTION

SECTION 02674

PRESSURE TESTING WATER DISTRIBUTION SYSTEMS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Work Specified
- B. Testing and disinfection of all pressure piping for leakage as specified.
- C. The CONTRACTOR shall furnish all labor, equipment, test connections, vents, water and materials necessary for carrying out the pressure and leakage tests as specified and required.
- D. The work specified shall include all labor, material, equipment, services and incidentals necessary to fill, clean, chlorinate, flush, and test all pipelines which will carry or hold potable water.

1.02. RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02510 – WATER DISTRIBUTION PIPING AND APPURTENANCES
- B. Section 02511 – WATER VALVES AND HYDRANTS

1.03. DESCRIPTION

- A. Permission shall be obtained from the OWNER of the water system before the use of water from any existing system. The CONTRACTOR shall:
- B. Conform to the requirements of the OWNER.
- C. Pay all costs connected with the taking or use of water for any retesting.
- D. The CONTRACTOR shall provide written notice to the Owner at least three working days in advance of testing and disinfection.
- E. All work under this section shall be performed in the presence of the Owner. A representative of the public health authority having jurisdiction must also be present, as required.

1.04. QUALITY ASSURANCE

- A. Reference Standards
 - 1. AWWA C104, Cement-Mortar Lining for Ductile Iron Pipe and Fittings for Water
 - 2. AWWA C502, Standard for Dry-Barrel Fire Hydrants
 - 3. AWWA C504, Standard for Rubber Seated Butterfly Valves
 - 4. AWWA C600, Standard for Installation of Ductile Iron Watermains and Construction
 - 5. NSF/ANSI Standard 60 and 61 (as applicable)
 - 6. Standard Methods for the Examination of Water and Wastewater, latest edition

7. 1996 Safe Drinking Water Act

1.05. SUBMITTALS

- A. The CONTRACTOR shall submit proposed materials, methods, and operations regarding testing and disinfection to the OWNER for review prior to the start of testing.
- B. CONTRACTOR must provide a sketch to the OWNER of the sampling locations identifying at minimum the following:
 - 1. Street names,
 - 2. North arrow,
 - 3. Sampling locations,
 - 4. House numbers of nearest buildings to sampling locations.
 - 5. Other distinguishable landmarks,
 - 6. Any other information as requested by OWNER, AUTHORITY, or County Health Department.
- C. The CONTRACTOR shall submit certification that all backflow preventers (Reduced Pressure Zone attachments) and pressure gauges have been tested and certified within the last year.
- D. For flushing operations, OWNER shall supply calculations identifying that a minimum 3.0 ft/sec scour velocity has been achieved in the new waterline and that three pipe volumes have passed through it.
- E. OWNER shall provide pressure testing and leakage test results on the Syracuse Water Department Pressure Test/Leakage Test form.

PART 2 PRODUCTS

2.01. MATERIALS

- A. All products must be suitable for use in a potable water system and NSF-60 certified. All piping, valves, etc. shall be NSF-61 certified.
- B. Chlorination shall be by the use of a solution of sodium hypochlorite contained in the pipe or structure as specified. The use of calcium hypochlorite in powdered, granular, or tablet form, shall not be allowed.

PART 3 EXECUTION

3.01. TESTS ON PRESSURE PIPING FOR POTABLE WATER A. GENERAL

- A. Flush, test and disinfect prior to connection to existing watermain as specified below, except as otherwise authorized by the Owner.
- B. The length of piping and sections included in the tests shall meet the approval of the Owner; however, the length shall not exceed 2,000 feet in any case. Pressure test of pipe section shall be from valve to valve regardless of watermain size.

- C. Notify the Owner 72 hours in advance of testing.
- D. Equipment in or attached to the pipes being tested shall be protected. Any damage to such equipment during the test shall be repaired by the Contractor at his expense.
- E. Conduct all tests per AWWA C-600 and C-651, latest editions in the presence of the Owner. Repeat tests in the presence of local authorities having jurisdiction if required by them.
- F. Contractor shall have sufficient personnel at the site for the entire duration of all tests.
- G. When piping is to be insulated or concealed in a structure, tests shall be made before the pipe is covered.
- H. Provide outlets to flush line, expel air, and perform specified tests.
- I. Where connections to existing lines are called for only one such connection will be allowed.
- J. All fittings, hydrants and appurtenances must be properly braced and harnessed before the pressure is applied. Thrust restraining devices which will become a part of the system must also be tested at the test pressure.
- K. When testing absorbent pipe materials such as cement or concrete, the pipeline shall be filled with water at least 24 hours before the test is made.
- L. The Contractor must supply all materials and manpower to perform the tests as specified herein.
- M. Testing and disinfection shall be acceptable and approved by the agency of jurisdiction before another connection is made.

3.02. INITIAL FLUSHING

- A. Contractor shall fill and flush new main to remove dirt and miscellaneous debris from the inside of the watermain.
- B. Contractor is responsible for removing all entrapped air during flushing.
- C. Flushing must have sufficient flowrate to achieve a fluid velocity of 3.0 feet per second inside the waterline.
- D. A minimum 2" tap is required for proper flushing of all watermains having a diameter of 8 inches or less, however, multiple taps or larger taps may be required. Owner shall be responsible for determining necessary connections and providing calculations verifying flushing conditions are met.
- E. Refer to AWWA C651, for number of taps required to obtain the minimum 3.0 feet per second flow velocity in all pipes.
- F. Contractor is responsible for providing a water source for flushing. With the permission of the Owner, an existing watermain may be used as a water source, however, the following restrictions apply:

1. The Contractor is not allowed to operate any valves or hydrants or operate any components which belong to the Owner.
 2. If water is drawn from the existing system, an appropriate backwater preventer such as a Reduced-Pressure Zone (RPZ) device must be used. The RPZ must be tested within one (1) year and approved prior to usage.
 3. Water from flushing procedures must be disposed of properly. Water may be piped or gravity-fed to an existing storm sewer with the Owner's permission if proper erosion control methods to minimize sediment build-up are used. Discharge of water into a roadway or into a parking lot area is strictly prohibited. Water discharging operations shall not cause damage to any public or private property.
- G. Contractor shall partially open and close valves and hydrants several times under expected line pressure to flush foreign material out of the valves and hydrants.
- H. Flushing shall continue until three pipe volumes have passed through the new waterline and the water appears sediment-free.

3.03. PRESSURE TEST

- A. Pressure test apparatus must be installed as shown on the Drawings
- B. Test pressure shall be as specified in Section 02510 – Water Distribution Piping and Appurtenances at the lowest point in the line.
- C. Test pressure shall be held on the piping for a period of at least 2 hours, unless a longer period is requested by the Owner, or Authority. Pressure should not fluctuate by more than 5 psi during testing.
- D. Pressure gauge must be in good working condition and must be demonstrated to be accurate to the Owner prior to any testing.
- E. Gauge must have proper labeling to allow Owner to accurately distinguish the maximum allowable 5 psi change in pressure. Gauge must have markings at no greater than 2 psi increments to allow accurate readings.
- F. Owner is responsible for reading the gauge and recording the test results he/she witnesses. Results obtained by the Owner are considered final, and not subject to discussion by the Contractor.
- G. Owner may tap pressure gauge at each reading to ensure needle is measuring pressure accurately.
- H. The Owner reserves the right to read the pressure gauge and record the test results for those lines considered suspect or for potentially inaccurate result recording.
- I. Owner shall record pressure at 15 or 30 minute intervals to help determine if the pressure loss is stabilizing.
- J. The Contractor will inform the Owner when to begin the test.
- K. If the pressure drop is greater than 5 psi in 2 hours, or if the Owner believes the line is suspect, the Contractor shall explore for the cause of the excessive leakage and after

repairs have been made, the line shall be retested. This procedure shall be repeated until the pressure loss is less than the maximum allowable and the Owner is satisfied.

- L. If the pressure drop is 3 psi or greater but less than 5 psi in 2 hours, the Contractor shall continue the test for another 2 hours. If the pressure drop over the 4 hour period is 5 psi or greater, the test failed and must be repeated after the cause of the leakage is explored and the necessary repairs have been made
- M. The Owner shall make a preliminary determination if the test passes or fails based on the pressure and volume losses recorded during testing.
- N. After each test, the Contractor must demonstrate that the test apparatus, including the pressure gauge, is fully functional and accurate. Inaccurate gauges or non-satisfactory equipment will be grounds for test failure, regardless of test results. Contractor will resupply proper equipment and retest, at his expense.
- O. The pressure loss recorded over the 2 or 4-hour test must be acceptable to the County Health Department and Authority for final hydrostatic testing approval to be given.
- P. At the end of the test, the pressure shall be increased to the starting pressure, so that the leakage test data is acquired.

3.04. LEAKAGE TEST

- A. The leakage test shall be conducted concurrently with the pressure test.
- B. The rate of leakage shall be determined at 15-minute intervals by means of volumetric measurement of the makeup water added to maintain the test pressure. The test shall proceed until the rate of leakage has stabilized or is decreasing below an allowable value, for three consecutive 15-minute intervals. After this, the test pressure shall be maintained for at least another 15 minutes.
- C. At the completion of the test the pressure shall be released at the furthestmost point from the point of application.
- D. All exposed piping shall be examined during the test and all leaks, defective material or joints shall be repaired or replaced before repeating the tests.
- E. The leakage for pressure pipelines shall not exceed the following allowable rates in gallons per hour per 1000 feet of pipe at the test pressure specified in Section 02510 - Water Distribution Piping and Appurtenances.
- F. 75% of allowable leakage per AWWA C600-17.
- G. Regardless of the above allowables, any visible leaks shall be permanently stopped.
- H. The Contractor shall provide a meter certified within the last year or a source-water tank/barrel of small enough cross section so that measurable changes in water depth can be accurately recorded. A two hour test is permitted for circular tanks/barrels of 15 inches in diameter or less. A four hour test is required for circular tanks/barrels greater than 15 inches in diameter. If a tank of non-circular cross section or irregular shape is used, and the change in water depth cannot be properly measured, the Owner may require the test

to be run more than 2 hours until an accurate depth change can be recorded and the Owner is satisfied with the results.

- I. The leakage volume recorded over the 2 or 4-hour test must be acceptable to the Onondaga County Health Department and Owner for final waterline approval to be given.

3.05. APPROVAL

- A. The Owner shall submit the Waterline Installation Complete Works Approval Report(s) to the Onondaga County Department of Health for review and processing.
- B. Once approval is given, after reconnecting the proposed piping to the existing piping, the Contractor shall slowly refill the watermain with water and allow it to pressurize so that the Owner may inspect the connections and/or other piping.
- C. The Contractor shall, at his expense, correct any observed defects to the satisfaction of the Owner.

END OF SECTION

**FLUSHING AND TESTING OF WATER MAIN
TABULATION SHEET**

Project _____

Location _____

Contractor _____

FLUSHING

Date _____ Weather _____ Temperature _____

Length Flushed _____ LF Pipe Diameter _____

Main Flushed _____ hours _____ minutes at _____ gal/min

Flushed Through _____ Hydrant _____ inch tap

Flow Measurement Method _____

WATER PRESSURE AND LEAKAGE TESTING

Date _____ Weather _____ Temperature _____

Length Tested _____ LF Pipe Diameter _____

Time Started _____ Time Finished _____ Elapsed Time _____

Starting Pressure _____ psi Finish Pressure _____ psi

Pressure Drop _____ psi Water Added _____ gal/hr Allowable Loss _____ gal/hr*

$$\text{Formula: } L = \frac{SD\sqrt{P}}{148,000}$$

L = Allowable Loss (gal/hr)

S = Length of Pipe Being Tested (ft.)

D = Diameter of Pipe (in.)

P = Average Test Pressure (psi)

Water Added < Allowable Loss?

If yes, PASS ____

If no, FAIL ____

Owner's Representative _____ Date _____

Contractor's Representative _____ Date _____

*Refer to AWWA C600 and AWWA C600 Table 4.A (Table 4.A located on next page)

Table 4.A: Hydrostatic Testing Allowance per 1,000 ft of pipeline* – gph

Avg. Test Pressure <i>psi</i>	Nominal Pipe Diameter— <i>in.</i>													
	4	6	8	10	12	14	16	18	20	24	30	36	42	48
450	0.57	0.86	1.15	1.43	1.72	2.01	2.29	2.58	2.87	3.44	4.30	5.16	6.02	6.88
400	0.54	0.81	1.08	1.35	1.62	1.89	2.16	2.43	2.70	3.24	4.05	4.86	5.68	6.49
350	0.51	0.76	1.01	1.26	1.52	1.77	2.02	2.28	2.53	3.03	3.79	4.55	5.31	6.07
300	0.47	0.70	0.94	1.17	1.40	1.64	1.87	2.11	2.34	2.81	3.51	4.21	4.92	5.62
275	0.45	0.67	0.90	1.12	1.34	1.57	1.79	2.02	2.24	2.69	3.36	4.03	4.71	5.38
250	0.43	0.64	0.85	1.07	1.28	1.50	1.71	1.92	2.14	2.56	3.21	3.85	4.49	5.13
225	0.41	0.61	0.81	1.01	1.22	1.42	1.62	1.82	2.03	2.43	3.04	3.65	4.26	4.86
200	0.38	0.57	0.76	0.96	1.15	1.34	1.53	1.72	1.91	2.29	2.87	3.44	4.01	4.59
175	0.36	0.54	0.72	0.89	1.07	1.25	1.43	1.61	1.79	2.15	2.68	3.22	3.75	4.29
150	0.33	0.50	0.66	0.83	0.99	1.16	1.32	1.49	1.66	1.99	2.48	2.98	3.48	3.97
125	0.30	0.45	0.60	0.76	0.91	1.06	1.21	1.36	1.51	1.81	2.27	2.72	3.17	3.63
100	0.27	0.41	0.54	0.68	0.81	0.95	1.08	1.22	1.35	1.62	2.03	2.43	2.84	3.24

*If the pipeline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.

SECTION 02675

DISINFECTION OF WATER DISTRIBUTION SYSTEMS

PART 1. GENERAL

1.01. SECTION INCLUDES

- A. Work Specified
- B. Disinfection of all pressure piping for leakage as specified.
- C. The Contractor shall furnish all labor, equipment, test connections, vents, water and materials necessary for carrying out the pressure and leakage tests as specified and required.
- D. The work specified shall include all labor, material, equipment, services and incidentals necessary to fill, clean, chlorinate, flush, and test all pipelines which will carry or hold potable water.

1.02. RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02510 - WATER DISTRIBUTION PIPING AND APPURTENANCES
- B. Section 02511 - WATER VALVES AND HYDRANTS

1.03. DESCRIPTION

- A. Permission shall be obtained from the Owner of the water system before the use of water from any existing system. The Contractor shall:
- B. Conform to the requirements of the Owner.
- C. Pay all costs connected with the taking or use of water for any retesting.
- D. The Contractor shall provide written notice to the Owner at least three working days in advance of testing and disinfection.
- E. All work under this section shall be performed in the presence of the Owner. A representative of the public health authority having jurisdiction must also be present, as required.
- F. Chlorination shall be scheduled such that sampling and flushing will be performed during normal business hours.

1.04. QUALITY ASSURANCE

- A. Reference Standards
 - 1. AWWA B300, Standard for Hypochlorites
 - 2. AWWA B301, Standard for Liquid Chlorine
 - 3. AWWA C104, Cement-Mortar Lining for Ductile Iron Pipe and Fittings for Water
 - 4. AWWA C502, Standard for Dry-Barrel Fire Hydrants
 - 5. AWWA C504, Standard for Rubber Seated Butterfly Valves
 - 6. AWWA C600, Standard for Installation of Ductile Iron Watermains and Construction

7. AWWA C651-14, Standard for Disinfecting Water Mains
8. NSF/ANSI Standard 60 and 61 (as applicable)
9. Standard Methods for the Examination of Water and Wastewater, latest edition
10. 1996 Safe Drinking Water Act

1.05. SUBMITTALS

- A. The Contractor shall submit proposed materials, methods, and operations regarding disinfection to the Owner for review prior to the start of testing.
- B. Contractor must provide a sketch to the Owner of the sampling locations identifying at minimum the following:
 1. Street names,
 2. North arrow,
 3. Sampling locations,
 4. House numbers of nearest buildings to sampling locations.
 5. Other distinguishable landmarks,
 6. Any other information as requested by Owner or Onondaga County Health Department.
- C. The Contractor shall submit certification that all backflow preventers (Reduced Pressure Zone attachments) and pressure gauges have been tested and certified within the last year.
- D. Qualifications of laboratory analyzing biological samples shall be New York State ELAP certified.
- E. Chain-of-Custody forms are to be furnished for all biological samples taken.
- F. For flushing operations, Owner shall supply calculations identifying that a minimum 3.0 ft/sec scour velocity has been achieved in the new waterline and that three pipe volumes have passed through it.
- G. Owner shall provide disinfection test results on the Syracuse Water Department disinfection form.

PART 2. PRODUCTS

2.01. MATERIALS

- A. All products must be suitable for use in a potable water system and NSF-60 certified. All piping, valves, etc. shall be NSF-61 certified.
- B. Chlorination shall be by the use of a solution of sodium hypochlorite contained in the pipe or structure as specified. The use of calcium hypochlorite in powdered, granular, or tablet form, shall not be allowed.

PART 3. EXECUTION

3.01. INITIAL FLUSHING

- A. Contractor shall fill and flush new main to remove dirt and miscellaneous debris from the inside of the watermain.
- B. Contractor is responsible for removing all entrapped air during flushing.
- C. Flushing must have sufficient flowrate to achieve a fluid velocity of 3.0 feet per second inside the waterline.
- D. A minimum 2" tap is required for proper flushing of all watermains having
- E. Diameter of 8 inches or less, however, multiple taps or larger taps may be required. Owner shall be responsible for determining necessary connections and providing calculations verifying flushing conditions are met.
- F. Refer to AWWA C651, for number of taps required to obtain the minimum 3.0 feet per second flow velocity in all pipes.
- G. Contractor is responsible for providing a water source for flushing. With the permission of the Owner, an existing watermain may be used as a water source, however, the following restrictions apply:
 - 1. The Contractor is not allowed to operate any valves or hydrants or operate any components which belong to the Owner.
 - 2. If water is drawn from the existing system, an appropriate backwater preventer such as a Reduced-Pressure Zone (RPZ) device must be used. The RPZ must be tested within one (1) year and approved prior to usage.
 - 3. Water from flushing procedures must be disposed of properly. Water may be piped or gravity-fed to an existing storm sewer with the Owner's permission if proper erosion control methods to minimize sediment build-up are used. Discharge of water into a roadway or into a parking lot area is strictly prohibited. Water discharging operations shall not cause damage to any public or private property.
- H. Contractor shall partially open and close valves and hydrants several times under expected line pressure to flush foreign material out of the valves and hydrants.
- I. Flushing shall continue until three pipe volumes have passed through the new waterline and the water appears sediment-free.

3.02. DISINFECTION

- A. Before disinfection, the line shall be cleaned and flushed with clean water as defined in the Initial Flushing section. Contractor shall provide outlets as required.
- B. The chlorine solution shall be admitted to pipelines through corporation stops placed in the horizontal axis of the pipe, to structures by means of tubing extending directly into the structure or other approved methods.

- C. Contractor shall install 2-inch saddles on existing and proposed mains and run 2-inch Type K copper tubing with backflow prevention device to allow for addition of chlorinated water. The rate of chlorine solution flow shall be in such proportion to the rate of water entering the pipe or structure that the resulting free chlorine residual shall be between 50 and 100 milligrams per liter (mg/l). Concentrations over 100 mg/l shall not be allowed to enter the piping system.
- D. The placement of chlorine powder or tablets inside the pipe during installation as a means of disinfection will not be allowed.
- E. The proposed piping shall be tested in all respects, prior to connecting the second end of the pipe to the existing system and prior to installing the annular fill at casing pipes.
- F. All valves to existing mains must be closed during the chlorination process. Contractor must flush the proposed main through a backflow preventer such as a Reduced Pressure Zone (RPZ) and 2-inch copper until chlorine residual at the opposite end reaches 50 mg/l. All valves to the existing water network are to remain closed until this level is reached. While the chlorinated water is being added, all appurtenances on the main shall be operated so as to completely disinfect the new work. The operation shall be repeated as necessary to provide complete disinfection.
- G. Chlorinated water from hydrants and taps must be properly collected and disposed of by the Contractor. Discharge of chlorinated water into the existing storm sewer or a natural water body shall not be allowed.
- H. The chlorine treated water shall be retained in the pipe or structure at least 24 hours, unless otherwise directed. During the retention period all valves and hydrants within the treated sections shall be operated.
- I. The chlorine residual shall be not less than 25 mg/l at any point in the pipe or structure at the end of the retention period. Contractor shall immediately perform final flushing to reduce the retention time high levels of chlorinated water.
- J. When making repairs to or when specified, structures and portions of pipelines shall be chlorinated by a concentrated chlorine solution containing between 200 mg/l and 300 mg/l of free chlorine. The solution shall be applied with a brush or sprayed on the entire inner surface of the empty pipes or structures. The surfaces disinfected shall remain in contact with the strong chlorine solution for at least 30 minutes.
- K. The Contractor must use an approved test method, as defined in AWWA C651 and Standard Methods for the Examination of Water and Wastewater, to determine chlorine levels. Test strips and test kits will be allowed for testing chlorine levels if the kit is less than six months old, in the original bottle, is not past the expiration date, and has a color coded scale on the side with legible concentrations defined. Owner reserves the right to reject test results if the test strip or kit is suspect. Sending samples to an approved laboratory is also acceptable.

3.03. FINAL FLUSHING

- A. Upon completion of each disinfecting operation, the Contractor will be required to empty the contents of the pipe into a tank truck. Dumping into a sewer will only be allowed with approval from the local governing body. In no instance will chlorinated testing or flushing water be

emptied onto the roadways, in ditches, culverts, streams, wetlands, or any other natural water body.

- B. Final flushing will continue until such time as the chlorine residual is between 0.5 and 1.2 mg/l.
- C. Prior to discharging into storm or sanitary sewer systems, and with the written approval of the municipality, the Contractor shall use a reducing agent (such as sodium thiosulfate) to neutralize any chlorine residual. Contractor shall prove to the Owner that the water has been properly neutralized prior to discharge using an appropriate testing method.

3.04. BACTERIOLOGICAL TESTING

- A. After disinfection and final flushing, a representative of the laboratory hired by the Contractor shall, in the presence of the Owner, take two bacteriological samples from sampling points at maximum 1,000-foot intervals along the waterline, at every branch off the main line, and at each end of the test section (one immediately after final flushing and a second one after 24 hours) for testing by an ELAP certified laboratory in accordance with the latest Health Department requirements.
- B. Should acceptable results not occur after these two consecutive tests, the Owner shall, at his expense, repeat the disinfection procedure until safe results are obtained.
- C. All precautions shall be taken to maintain dry and sanitary conditions and to prevent contamination of any piping, at the Contractor's expense.
- D. If, in the opinion of the Owner, contamination has occurred, the Contractor shall repeat the disinfection and bacteriological testing at his cost and expense.
- E. Test results from the laboratory shall be sent directly to the Owner. Test results sent through the Contractor shall not be considered.
- F. Bacteriological test results shall expire 30 calendar days after the samples are taken. After 30 calendar days, the Contractor shall be required to repeat the process, taking two sets of samples and submitting results for review.
- G. As per AWWA C651-14 standards, the limit for pipe installed without bacteriological samples being taken is 20 linear feet.

3.05. APPROVAL

- A. The Owner shall submit the Waterline Installation Complete Works Approval Report(s) to the Onondaga County Department of Health for review and processing.
- B. Once approval is given, after reconnecting the proposed piping to the existing piping, the Contractor shall slowly refill the watermain with water and allow it to pressurize so that the Owner may inspect the connections and/or other piping.
- C. The Contractor shall, at his expense, correct any observed defects to the satisfaction of the Owner.

END OF SECTION

**DISINFECTION, TESTING, AND FLUSHING OF WATER MAINS
TABULATION SHEET**

Project _____

Location _____

Contractor _____

Date _____ Weather _____ Temperature _____

Length Disinfected _____ LF Pipe Diameter _____

Discharge Rate _____ gal/min Hypochlorite Solution Strength _____

Initial Chlorine Residual (end of line) _____ mg/L Time _____

24 Hour Chlorine Residual (end of line) _____ mg/L Time _____

Residual Measurement Method _____

Flushing Rate _____ gal/min Flushing Duration _____ Date _____

Bacteria Sample Location #1 _____ Time & Date _____

Bacteria Sample Location #2 _____ Time & Date _____

Bacteria Sample Location #3 _____ Time & Date _____

Did Bacteria Sample Pass or Fail Total Coliform Requirements? _____

Main Ready for Service Date _____ Time _____

Main Put into Service Date _____ Time _____

Formula for calculating required amount of sodium hypochlorite

$$\text{Gallons of sodium hypochlorite required} = \frac{\text{Required ppm chlorine} \times \text{Volume of pipe in gal}}{\% \text{ of chlorine used} \times 10,000}$$

Owner's Representative _____ Date _____

Contractor's Representative _____ Date _____

HOT BOX[®] ALUMINUM DROP OVER ENCLOSURES

Hubbell Hot Box aluminum drop overs make it easy to provide premium protection for 3/4" - 2" pipe sizes. The addition of these sizes round out the legacy product offering which provides coverage for up to 10" pipe sizes. These smaller drop over sizes still offer the same quality and dependability as their larger counterparts.

Trusted since 1986 and requested by name, Hot Box enclosures are built with legacy quality and performance continuing to exceed your expectations.

FEATURES AND BENEFITS

- Protects equipment from freezing temperatures
- Riveted construction providing superior strength and durability
- Side located drain ports allow for field installation of custom penetrations
- Stucco embossed finish allows for longer lasting visual appeal hiding any imperfections as a result of the elements
- Unheated and heated units available. Heated units are equipped with heat trace tape providing long term performance and safety
- Standard aluminum, green and federal brown (mill finish) colors available
- Quick and easy installation
- ASSE 1060 certified



Catalog Part Number	Model Number	Inside Width (in)	Inside Length (in)	Inside Height (in)	Heat	Weight #
HJ013026023	AEZ.75H	13	26	23	90W Heat Trace Tape	30
HJ013038026	AEZ1SH	13	38	26	90W Heat Trace Tape	34
HJ015047028	AEZ2SH	15	47	28	90W Heat Trace Tape	38
LJ013026023	AEZ.75L	13	26	23	Unheated	29
LJ013038026	AEZ1SL	13	38	26	Unheated	33
LJ015047028	AEZ2SL	15	47	28	Unheated	37



Hot Box® Sectionalized Aluminum

BACKFLOW PREVENTION ASSEMBLY ENCLOSURE SPECIFICATION

GENERAL

1.1 WORK INCLUDED

- A. Provide and install manufactured backflow prevention assembly enclosure.

1.2 QUALITY ASSURANCE

- A. Qualifications: The backflow prevention assembly enclosure manufacturer shall be a company specializing in the manufacture of backflow prevention assembly enclosures with at least **30** years of successful experience designing and selling enclosures to various customers in different climatic regions.

1.3 STORAGE AND HANDLING

- A. Store products in shipping containers and maintain in dry place until installation.

1.4 ACCEPTABLE MANUFACTURERS

- A. **Hot Box®** or Engineer approved equal.

1.5 REFERENCES

- A. ASSE 1060-Performance Requirements for Outdoor Enclosures for Backflow Prevention assemblies.
- B. ASTM B209.

PRODUCTS

2.1 SECTIONALIZED ALUMINUM ENCLOSURES

- A. Enclosure shall be factory assembled with tongue and grooved sections that slide together and are then secured to the concrete pad with the supplied wedge anchors.
- B. Access panels have a four point locking system with pad lockable handle and are completely removable.
- C. Drain ports are sized for full port backflow discharge and are designed for a one way operation allowing backflow discharge but not allowing wind, debris and small animals to enter the enclosure.
- D. Standard enclosures shall be designed to support a minimum vertical load of 100lb/sf.
- E. Standard enclosures up to 36"W x 105"L x 64"H shall be designed to support wind speeds up to 120mph, all larger sizes shall be designed to support wind speeds up to 80mph.
- F. Standard enclosures are ASSE 1060 certified.
- G. Custom enclosures are designed and constructed in the same manner as standard certified enclosures, but have not been lab tested and listed by ASSE.

2.2 MATERIALS OF FABRICATION

- A. Aluminum sheeting shall be 3003 aluminum (.050/18 gauge), stucco embossed finish and shall meet ASTM B209. Stucco embossed finish reduces the glare and helps hide any surface scratches or imperfections received in the field.
- B. Bracing shall be 6063-T52 aluminum and shall meet ASTM B221
- C. No wood or particle board to be used in the construction.
- D. Anchor pads (galvanized steel) with 3/8-16 unc x 2 ¾ long zinc plated wedge anchors and drill bit are to be supplied.
- E. Insulation shall be approximately 1.5" unicellular, non-wicking, polyisocyanate foam sprayed in place that forms a monolithic bond between the aluminum bracing and aluminum sheeting.
- F. The Insulation shall have the following properties:
 - R-Value 10

Hot Box
3621 Industrial Park Drive
Lenoir City, TN 37771

Contact Information
Phone: (800) 736-0238
waterhlc@hubbell.com
www.hot-box.com

- | | |
|-------------------------|----------------------------|
| • Dimensional Stability | less than 2% linear change |
| • Compressive Strength | 51psi |
| • Flame point | 325 degrees |
| • Water absorption | .037psf |
| • Porosity | 91% |

2.3 HEATING EQUIPMENT (ASSE 1060 Class I-Required; ASSE 1060 Class II-Optional)

- A. Heating equipment shall protect the piping and equipment from exterior temperatures to -30°F. ETL listed thermostatically controlled wall mounted air forced heaters shall be furnished and designed by the enclosure manufacturer to maintain the equipment at +40°F, in accordance with ASSE 1060 1.2.2.1.
- B. Heating equipment shall be wall mounted to the supplied heater plates and a minimum of 8" above the slab unless it is UL or ETL certified and NEC approved for submersion.
- C. Power source shall be protected with a GFI receptacle, U.L. 943, NEMA.3R. Mounted a minimum of 8" from the bottom of the receptacle to the top of the slab.
- D. Separate 20 amp circuits are recommended for each heater, so in the event a circuit fails all other circuits will remain powered. Installations must be in accordance with the local and national codes.
- E. The heaters shall be ETL listed for wet/damp locations.

2.4 RECOMMENDED SLAB SIZE & INSTALLATION

- A. The recommended slab size shall be 9" larger than the enclosures exterior dimensions and a minimum of 4" thick.
- B. The enclosure shall be assembled and mounted to concrete slab per the manufactures instructions provided with the enclosure.

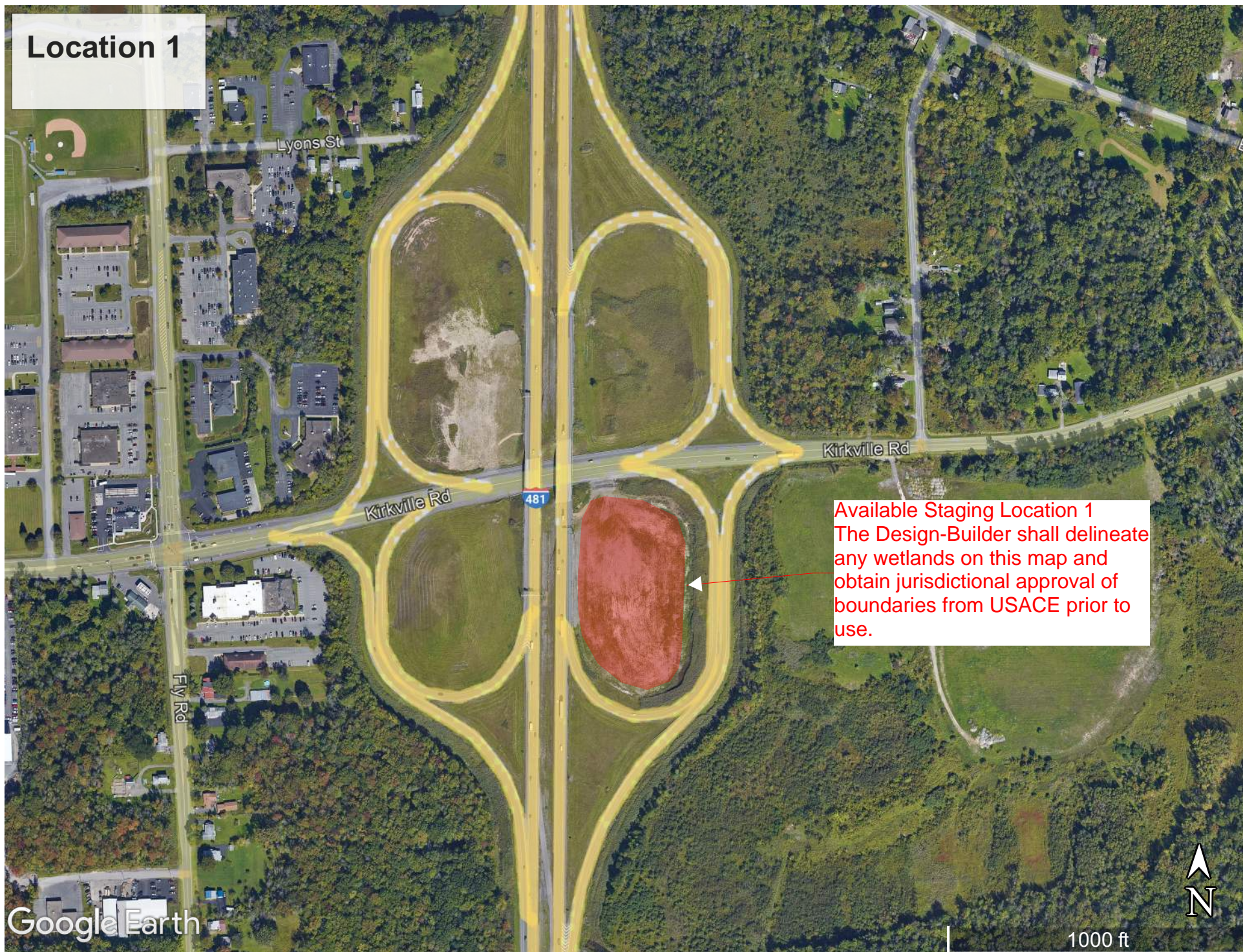
Hot Box
3621 Industrial Park Drive
Lenoir City, TN 37771

Contact Information
Phone: (800) 736-0238
waterhlc@hubbell.com
www.hot-box.com

Available Staging Areas

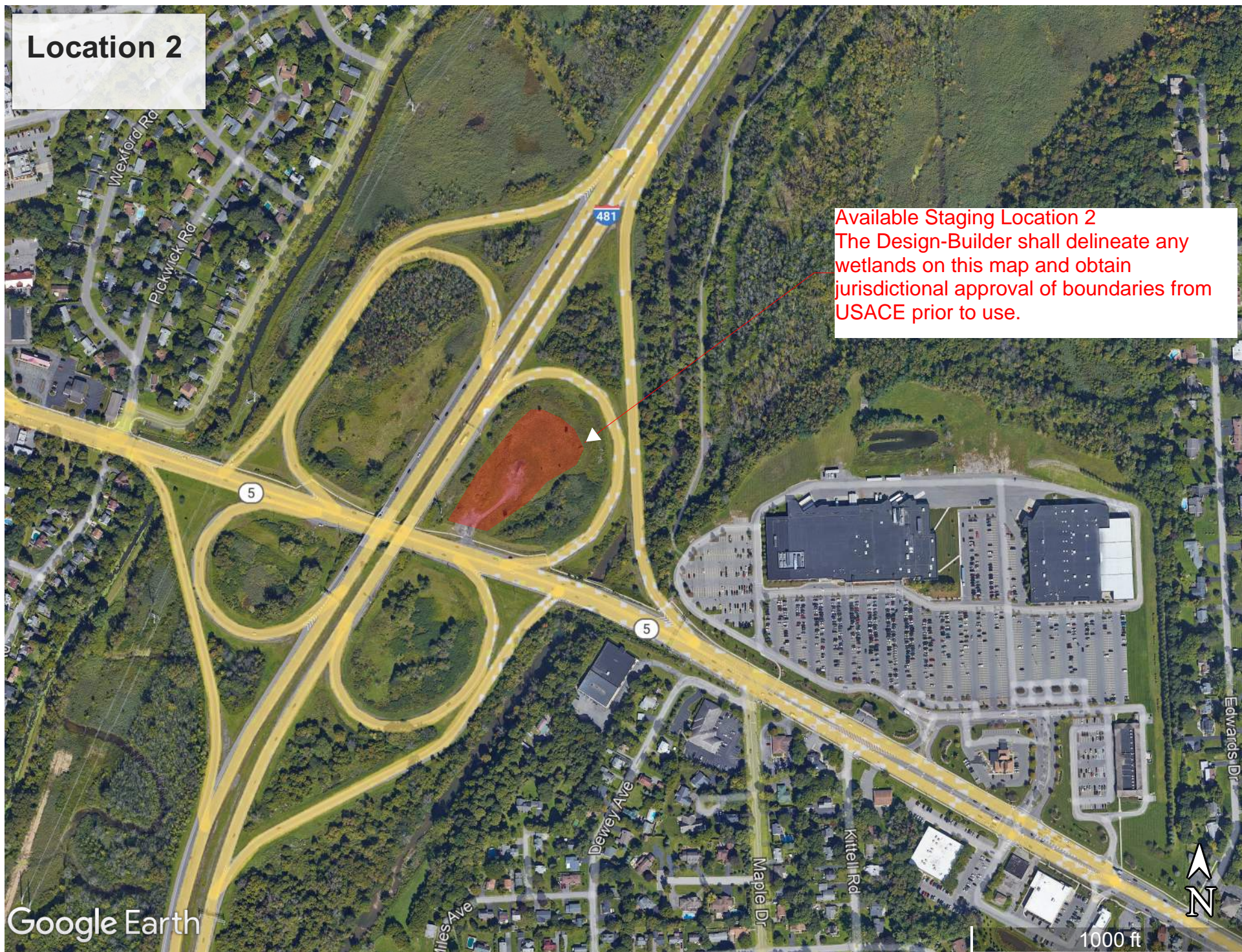


Location 1

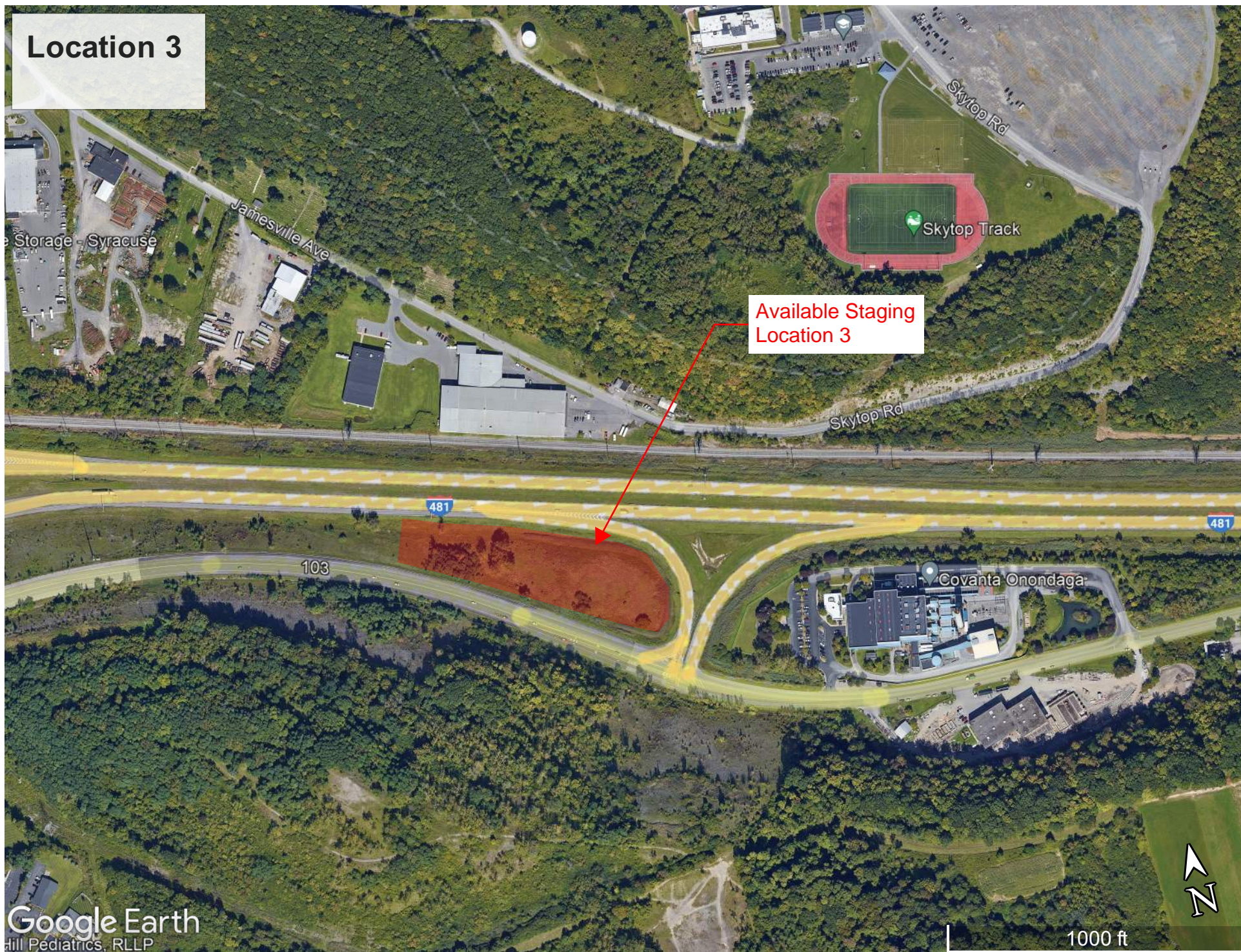


Available Staging Location 1
The Design-Builder shall delineate any wetlands on this map and obtain jurisdictional approval of boundaries from USACE prior to use.

Location 2



Location 3



Location 4

Available Staging
Location 4



ITEM 406.XXYZ0108 – WARM MIX ASPHALT (WMA) WITH POLYMER FIBERS
ITEM 555.02XXX01 – CONCRETE FOR STRUCTURES CLASS MP (MASS PLACEMENT)
ITEM 555.12010001 - STRUCTURAL LIGHTWEIGHT CONCRETE
ITEM 555.80020001 - CRACK REPAIR BY EPOXY INJECTION (RESTORATION)
ITEM 557.01040018 - LIGHTWEIGHT, HIGH - PERFORMANCE SUPERSTRUCTURE SLAB WITH INTEGRAL WEARING SURFACE - BOTTOM FORMWORK REQUIRED
ITEM 557.11010003 - INTEGRAL PRECAST CONCRETE BARRIER
ITEM 557.2500NN16 - CRACK SEALING USING HIGH MOLECULAR WEIGHT METHACRYLATE – LINEAR CRACKS
ITEM 557.2600NN16 - CRACK SEALING USING HIGH MOLECULAR WEIGHT METHACRYLATE - FLOODING
ITEM 557.6601NN16 - ULTRA-HIGH PERFORMANCE CONCRETE (UHPC)
ITEM 564.20010008 – HOT-DIP GALVANIZING OF STRUCTURAL STEEL
ITEM 565.20310003 – ELASTOMERIC SLIDING BEARINGS (EXPANSION)
ITEM 567.51000016 - SEALING EXISTING BRIDGE DECK JOINTS
ITEM 572.0002NN01 - METALIZING
ITEM 579.03000002 - STRUCTURAL SLAB RECONSTRUCTION PREPARATION, HYDRODEMOLITION – REINFORCEMENT EXPOSURE NOT REQUIRED
ITEM 582.99000016 - EMBEDMENT OF GALVANIC ANODES IN CONCRETE
ITEM 584.21010001 - ULTRA-HIGH PERFORMANCE CONCRETE (UHPC) OVERLAY
ITEM 607.41010010 - TEMPORARY PLASTIC BARRIER FENCE
ITEM 611.190X0024 - POST-PLANTING CARE WITH REPLACEMENT
ITEM 613.70XX0011 - BIRD REPELLENT SYSTEM
ITEM 634.99010017 – BUILDING CONDITION SURVEY
ITEM 634.99020017 – VIBRATION MONITORING (NONBLASTING)
ITEM 637.4000NN20 - WEBCAM SYSTEM
ITEM 643.99010004 - PRECAST CONCRETE NOISE BARRIER SYSTEM
ITEM 662.60000415 – FURNISHING ELECTRICAL SERVICE
ITEM 680.05010007 – 360 DEGREE CAMERA VIDEO DETECTION SYSTEM
ITEM 680.05020007 – 360 DEGREE CAMERA ASSEMBLY
ITEM 680.05040004 – ADVANCE VEHICLE VIDEO DETECTION CAMERA FOR TRAFFIC SIGNALS
ITEM 680.80324515 - INSTALL MICROCOMPUTER CABINET
ITEM 680.80325010 – ALUMINUM MICROCOMPUTER CABINET BASE
ITEM 680.81330010 – AUDIBLE PEDESTRIAN SIGNAL
ITEM 680.81500010 – PEDESTRIAN COUNT-DOWN TIMER MODULE
ITEM 680.90920103 – ELECTRIC METER CHANNEL, 100 AMPERE, SINGLE PHASE, 240 VOLT FOR TRAFFIC SIGNAL INSTALLATIONS
ITEM 680.94997008 – FURNISH AND INSTALL ELECTRICAL DISCONNECT/ GENERATOR TRANSFER SWITCH
ITEM 680.95010615 – SERVICE CABLE 1 CONDUCTOR, NO. 06 AWG
ITEM 683.04XXXY02 - CCTV CAMERA MOUNTING POLE WITH LOWERING DEVICES
ITEM 683.06010013 - TRAFFIC MONITORING CABINET
ITEM 683.07250010 - FIBER OPTIC DROP CABLE
ITEM 683.10120008 - HD IP CAMERA ASSEMBLY - DOME TYPE
ITEM 683.10900010 - 5.8 GHz. WIRELESS VIDEO TRANSMITTER
ITEM 683.10910010 - 5.8 GHz. WIRELESS VIDEO RECEIVER
ITEM 683.30240108 – INSTALL RWIS TYPE 1-FULL STATION

ITEM 683.91150010 – MULTI-LANE RADAR TRAFFIC DETECTOR - FURNISH AND INSTALL
ITEM 683.93XXYZ04 – DYNAMIC MESSAGE SIGN (DMS) FULL MATRIX, FRONT ACCESS LED
ITEM 683.95010011 - MPEG-4 VIDEO ENCODER, SINGLE CHANNEL
ITEM 683.95050010 – ETHERNET SWITCH
ITEM 683.96100305 – POWER DISTRIBUTION UNIT
ITEM 685.1X010004 – EPOXY PAINT WITH WET-NIGHT REFLECTIVE ELEMENTS 20 MILS (GROOVED PAVEMENT METHOD)
ITEM 800.01000015 – DESIGN BUILD – DESIGN SERVICES
ITEM 800.02000015 – DESIGN BUILD – CONSTRUCTION INSPECTION SERVICES
ITEM 800.03000015 – DESIGN BUILD – QUALITY CONTROL SERVICES
ITEM 800.0400NN15 – DESIGN BUILD – EXTRA WORK
ITEM 800.05000015 – DESIGN BUILD – SITE MOBILIZATION
ITEM 800.06000115 – DESIGN BUILD – CONSTRUCTION WORK
ITEM 800.06XXNN15 – DESIGN BUILD – CONSTRUCTION WORK – STRUCTURAL REPAIRS
ITEM 800.1000NN15 – DESIGN BUILD – UTILITY RELATED WORK
ITEM 800.14000115 - DESIGN BUILD - LOCAL HIRE INCENTIVE
ITEM 800.15000115 – DESIGN BUILD - TRAINING REQUIREMENTS
ITEM 800.16000120 – DESIGN BUILD – STEEL/IRON PRICE ADJUSTMENT

In the event of a discrepancy between the version of any Special Specification attached herein and the version available from the NYSDOT web site listed above, the version included in these Contract Documents shall apply.

ITEM 683.30240108 - INSTALL RWIS TYPE 1-FULL STATION
ITEM 683.30240208 - INSTALL RWIS TYPE 2-SEMI-STATION

DESCRIPTION:

Under this item, the Contractor shall install a Road Weather Information System (RWIS), including environmental sensor stations, mounting structures, mounting equipment and accessories and remote processing units (RPU) as directed in the contract document. The RWIS equipment are existing and are listed in the contract plan. The RWIS station shall be installed and configured to monitor, collect, and display atmospheric and pavement conditions at the locations shown on the contract documents, and as described herein.

The contractor shall submit the installation package documenting per the RWIS equipment manufacturer. The contractor shall provide necessary hardware accessory and cables and wiring for completion of installation, operation and testing the equipment. All equipment supplied under the contract must be new; shall not be used, rebuilt, refurbished; shall not have been used as demonstration equipment, and shall not have been placed anywhere for evaluation purposes.

Installation of RWIS Station Type 1 include a full station with atmospheric and invasive and non-invasive pavements sensors. This installation include pole, cabinet, atmospheric sensors, noninvasive pavement condition sensors (surface temperature, surface condition and snow and ice measurement) and invasive sub-surface probe sensors.

Installation of RWIS Type 2 include a semi-station with non-invasive pavements sensors. This installation includes RPU, power and communication/ network equipment and noninvasive pavement condition sensors (surface temperature, surface condition and snow and ice measurement).

The RWIS type 1 and 2 shall be furnished with the RWIS equipment manufacturer device management software/ web interface that allows the Regional Transportation Management Center (RTMC) network engineers remotely monitor, configure, and optimize the stations operation and receive the alert notification.

MATERIALS:

All materials furnished, assembled, fabricated, or installed shall be new, corrosion resistant, and in strict accordance with the standards set by the New York State Department of Transportation (NYSDOT). Each RWIS type 1 and 2 shall be assembled with all hardware, software, and configuration for complete operation of the unit per manufacturer recommendations. List of NYSDOT furnished RWIS equipment and their manufacturer references are included in the contract plan.

CONSTRUCTION DETAILS:

The Contractor shall coordinate the schedule of all RWIS type 1 and 2 construction work and provide installation accessory material, method, and details of mounting, wiring and cabling, station commissioning, station inspection and testing with RTMC.

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The RWIS type 1 equipment shall be installed in RWIS cabinet. The cabinet shall be installed on a designated field location as shown on the plans along with and cables and necessary mounting brackets. The RWIS type 2 equipment shall be installed on a designated field cabinet as shown on the plans along with and cables and necessary mounting brackets. RWIS sensors shall be installed per manufacturer recommendation and guideline. The contractor shall submit all licenses and warranty information of the RWIS type 1 and 2 to the RTMC for review and approval.

The contractor shall follow the manufacturer recommendation for integrating the station to the manufacturer central system and provide a remote monitoring and manage capability for all RWIS stations in the contract from RTMC. The remote management services shall not have any cost for NYSDOT until three years after RWIS station acceptance.

- **RWIS type 1 and 2 installation requirement:**

This installation shall comply with following requirement:

- Inspection the existing RWIS equipment and cables furnished by NYSDOT and provide details of necessary accessories for complete installations.
- Install RWIS Mounting Structure pole furnished by NYSDOT as detailed in the plans. All parts subject to wear shall be made from stainless steel. The mounting structure material shall be aluminum conforming to the 2013 (or most recent version with latest revisions) of the AASHTO Standard Specifications for Structural Supports for Highway Signs Luminaires and Traffic Signals.
- Install, calibrate and testing RWIS sensors per manufacturer recommendation
- Install RWIS Remote Processing Unit (RPU), power supply and communication interfaces per manufacturer recommendations. All equipment shall be test locally and centrally.
- Full Configuration and programming of the RWIS station including all sensors, RPU, power supply/ battery backup, communication interface and alarm generating and notification.
- Provide alert trigger I/O for activation of a DMS or other device via hardwire or logic connection.
- The RWIS type 1 and 2 installation shall include the network Wide Area Network (WAN) and WiFi connection and integration to the existing RWIS central monitoring system from the manufacturer.
- All electrical code requirement including grounding and electrical power connection shall comply with latest revision of NEC code.
- All installed materials shall be as per RTMC approved submittal. All installation work shall be professional installation accepted for electrical work.

- **DOCUMENT:**

In addition of the construction submittals the contractor shall submit the item close-out documentation. The close-out document shall comply with RTMC ITS project close-out

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requirement, which is included supplemental information material section of the contract document. The contractor shall submit all documentation related to RWIS type 1 and 2 components including, material part list, manual and guidelines, licenses certificate, firmware, web user interface software, remote management platform/ software, configurations, testing and RWIS type 1 and 2 layout as-built plans to the RTMC for review and approval.

- **WARRANTY**

The Contractor shall be required to warranty all equipment and installation for a period of not less than 12 months from the date of final system acceptance by the Department of Transportation. The Contractor shall provide warranties and guarantees to the New York State Department of Transportation in accordance with Article 104-08 of the Standard Specifications.

METHOD OF MEASUREMENT:

Each INSTALL RWIS TYPE 1-FULL STATION will be measured as the number of complete stations installed, configured, operational, remotely managed, warranted and tested.

Each INSTALL RWIS TYPE 2-SEMI STATION will be measured as the number of complete stations installed, configured, operational, remotely managed, warranted and tested.

BASIS OF PAYMENT:

The unit price bid for each RWIS type 1 and 2 shall include the cost of furnishing all labor, materials, tools, pedestal, accessory equipment, web user interface, central monitoring, and management service for three years, support, installation warranty, testing and incidentals as necessary to complete the work.

Progress payments will be made as follows:

- Twenty Five percent (25%) of the bid price of each item will be paid upon satisfactory completion and approval of the RWIS type 1 and 2 Submittals.
- Sixty percent (60%) will be paid upon satisfactory completion of the RWIS type 1 and 2 function operation tests.
- Fifteen percent (15%) will be paid upon satisfactory completion of 90-Day Operational Test of the RWIS type 1 and 2 and reception of all documentation from the RTMC.